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FINAL REPORT

EVALUATION OF THE CONTRIBUTION TO THE S₃ OBJECTIVES

PO FESR SICILIA 2014/2020

Evaluation Report carried out by IZI SpA – Rome

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EXECUTIVE SUMMARY

The report has as its object the evaluation of effectiveness, efficiency and impact of the Operational Program (OP) of the ERDF Sicilian Region 2014-2020 and of its contribution to the achievement of the general and specific objectives identified by the Regional Strategy for Smart Specialization (S3), included in the Evaluation Plan of the OP ERDF Sicily 2014-2020.

The evaluation was carried out by IZI using a multidisciplinary and multi-methodological approach, favoring in particular the Theory Based approach, as well as the constructivist and realist approaches, which involved the use of a multiplicity of sources of information, investigated using specific survey tools and methodologies (survey with the beneficiaries of the OT1 and OT2 projects, in-depth interviews with stakeholders and key subjects, case studies, network analysis, CAWI survey with the recipients of the SovraCUP project of the Sicilian Region) .

In particular, the survey carried out allowed us to reach evaluative conclusions in reference to the expected results of thematic axis 1 "Research, technological development and innovation", relating to the increase in the number of companies carrying out R&D activities in collaboration with external and to the increase in the innovation activity of companies.

In particular, the OP ERDF Sicily 2014 - 2020 contributed to strengthening the competitiveness of the regional production system by supporting the diffusion of innovation of innovative solutions and services in response to unsatisfied social, economic and environmental needs in the six thematic areas of the S3, consistently with the provisions of the Guidelines on the Smart Specialization Strategy (S3) developed by the European Commission.

As illustrated in the Report, to achieve these results, the Sicilian Region intended to give great impetus to support for the development of connections and synergies between companies and research centres, focusing mainly, in terms of resources, on the financing of interventions within the 'Action 1.1.5 to support the technological advancement of businesses. In doing so, significant effects of technological advancement of companies and technological improvement at the level of products and processes were obtained, on the basis of pilot line experiments and functional actions for the development of new applications, as well as following the adoption of new highly developed prototypes. innovative and new technological protocols and production processes which are also innovative and the application of key enabling technologies (KETs). Furthermore, Action 1.1.5 has contributed significantly to the development and consolidation of networks between businesses, universities and research institutions, as a determining factor of impact and sustainability to promote innovation, develop a series of necessary skills and also innovate products and industrial processes in all areas of the S3 Strategy. In particular, the element of stability of partnerships was found to be a factor of continuity, sustainability and strengthening of innovation. In this context, both the customary relationships between companies and university departments and, in particular, the role played by Sicilian universities, and more generally by research centres, in the implementation of innovation activities were found to be fundamental. This collaboration between businesses and universities has effectively led to dynamics of exchange and contamination which has led to mutual benefits, as well as the extension of the network of relationships sometimes even beyond regional borders.

As part of Action 1.1.2, many companies were supported for the purchase of advanced catalog services offered by qualified and selected suppliers and in this way a very significant contribution was made to increasing the innovation activity of the companies, through the introduction of many products and services that were new for the company and which were able to satisfactorily strengthen the competitive positioning of the companies in the areas of regional specialization identified in S3. In particular, through this action important effects were achieved in the development and commercial improvement of the companies involved, as well as the improvement of the technical-organisational capacity and company organisation.

Finally, as regards Action 1.1.3, the contribution of the financed operations to the increase in the innovation activity of Sicilian companies was inevitably partial, given that this action was the least supported, in terms of resources allocated, by Sicilian Region in the context of OS1.1, due to the reduced participation in the tender by companies, and in consideration of the implementation delays, mainly caused by the pandemic, taking into account that most of the projects of Action 1.1.3 were started precisely in conjunction with the period of the health emergency. Nonetheless, this action provided a direct contribution to the S3 Strategy mainly in the Agri-

Food, Life Sciences, Smart Cities & Communities, Tourism and Culture areas, given the noted effects of the adoption of innovative solutions in the processes, which led to the industrialization of search results. Significant effects were also recorded in terms of product innovation, while the contribution to innovation in organizational formulas was more limited.

The aforementioned effects were generated despite a series of critical factors mainly linked to the problems generated by the Covid-19 pandemic and the economic crisis resulting from the Russian-Ukrainian conflict, which negatively influenced the possibility of achieving the expected results, slowing down the implementation process or reducing the potential positive effects. In addition to these exogenous critical issues linked to the context, secondary critical factors relating to management and administrative difficulties of the projects and financial criticalities were recorded, which also slowed down the achievement of the expected effects.

On the other hand, overcoming the highlighted obstacles and achieving the important innovation effects of the companies was possible thanks to a series of success factors that are crucial for the success of the projects such as the quality of the project working group and above all the quality of the partnership, in terms of skills and competences, which made it possible to deal with the aforementioned difficulties and unexpected project events, through synergistic and effective collaboration.

The report also contains the evaluation conclusions in reference to the expected results of thematic Axis 2 "Information and communication technologies", relating to the reduction of digital divides in the territories and the diffusion of broadband and ultra-broadband connectivity consistently with the objectives set to 2020 by the European "Digital Agenda" (OS 2.1) and the digitalisation of administrative processes and the dissemination of fully interoperable digital PA services offered to citizens and businesses (in particular in healthcare and justice) (OS 2.2).

In particular, with regard to OS 2.1, two large projects were financed with a total of 221 million euros: the Regional Ultra-Broadband (BUL) (Action 2.1.1a), whose beneficiary was Telecom Italia SpA, and the "Large National Ultra-Broadband Project" (Action 2.1.1b) which is in an advanced stage of implementation, managed by the MISE. These projects mainly concerned rural and internal areas, in which 142 municipalities were covered with the BUL and 1,123,786 real estate units were enabled for 30 Mbps, for a population of 2.31 million inhabitants (as well as 1,165 public offices central and local administration). The other project, which benefited the MISE and is currently still underway, has enabled 233,867 real estate units to receive 30 Mbps.

Despite the implementation delays and difficulties encountered, the action has nevertheless provided an important contribution, also thanks to a certain flexibility and ability to adapt to the reference context, to the reduction of the structural digital divide, and consequently to the achievement of the objectives set in 2020 from the European "Digital Agenda" and above all to the second objective of the S3 Strategy, with an impact on all the thematic areas of the S3 Strategy, obviously starting from the one called Smart cities.

The increased digital connectivity achieved thanks to the OP ERDF 2014-2020 constitutes a great opportunity for the strategic development of Sicily, its entrepreneurial fabric, its public administrations, and its citizens, and lays the foundations for triggering inclusive, intelligent growth and sustainable. This is an opportunity which has taken on new characteristics as a result of the transformations induced by the COVID-19 pandemic which has shown even more the importance of reducing digital divides in all areas of the country to guarantee the continuity and development of activities economic and social.

OS 2.2 instead envisaged two distinct actions: Action 2.2.1 "Technological solutions for the digitalisation and innovation of the internal processes of the various areas of Public Administration" within the framework of the public connectivity system, such as for example justice (computerisation of civil proceedings), healthcare, tourism, cultural activities and heritage, business services; Action 2.2.3 "Interventions to ensure the interoperability of public databases". Overall, thanks to the actions carried out, an effective improvement in the quality of digital services for citizens was achieved. Some of the funded projects are still ongoing.

In particular, with reference to Action 2.2.1, an effective diffusion of digital services was achieved in the university context, both through document management platforms (e.g. University of Catania and University of Palermo) and through educational innovation interventions through digital environments, virtual assistance, specific virtual reality classrooms, apps and digital platforms (e.g. University of Messina). Furthermore, thanks to the implementation of the SovraCUP project, dedicated to the booking of specialist visits and diagnostic tests in the

Health Authorities of the Sicilian Region, an effective improvement in access to health services for citizens was achieved, effectively contributing, also in this case, to achieve Objective 2 of the S3 Strategy of improving the quality of life of Sicilians, through a service capable of concretely addressing the issues of accessibility of services and waiting times. Overall, the aforementioned diffusion of digital services has generated an effective reduction in the management times of administrative procedures and an improvement in the quality of local public digital services, especially for citizens and businesses.

Finally, the projects carried out under Action 2.2.3 also provided a significant contribution to the strengthening of local public telematic services and to the improvement of the administrative capacity of the Region and public administrations and had a transversal impact on all areas themes of the S3 Strategy. This was possible thanks to the implementation of interventions to digitalize administrative processes and promote the interoperability of public databases, through projects such as Open data Sicily, Cloud 1 and 2 and territorialized projects functional to the dematerialization of administrative procedures.

INTRODUCTION

This Report concerns the evaluation of effectiveness, efficiency and impact of the Operational Program (OP) of the Sicilian Region ERDF 2014-2020 and of its contribution to the achievement of the general and specific objectives identified by the Regional Strategy for Smart Specialization (S3), included in the Evaluation Plan of the OP ERDF Sicily 2014-2020.

As required by the technical specifications, the evaluation focused on the analysis of the results and impacts of some of the interventions carried out during the programming, with particular reference to the areas of action of the Thematic Objectives OT1 and OT2 and the related investment Priorities 1 .b, 2.a and 2c and related specific objectives OS1.1, OS2.1. and OS2.2.

This evaluation was based on the evaluation plan, shared with the Administration, which involved the operational determination of the theoretical methodological approach chosen for the analysis, illustrated in the "analysis methodology" appendix, appropriately integrated in light of the reconstruction of program theory. In particular, the evaluation was built starting from the data and information of the financial, procedural and physical monitoring system provided by the Coordination Authority of the Management Authorities (AcAdG) of the OP ERDF Sicily 2014 - 2020, i.e. the Regional Department of Programming (DRP) of the Presidency of the Sicilian Region.

As specified in the aforementioned methodological appendix, the evaluation was carried out using a multidisciplinary and multi-methodological approach, favoring, in particular, the Theory Based approach, as required by the technical specifications, as well as the "realist" and "constructivist", as they are potentially functional not only to the identification of the dependent effects of the Program, but also of the main "mechanisms" that can help explain the causal links, i.e. the relationships between the inputs, i.e. the resources used for the planned interventions and methods of implementation, and the outputs of these interventions, the role of the main subjects involved in the world of research and business and, above all, the various critical and success factors that have had a decisive influence on the achievement of the expected effects from the Program.

Furthermore, as illustrated in the same methodological appendix, this evaluation was carried out using a mixed methods approach mainly of a qualitative nature (non-experimental or quasi-experimental), which involved the use of a multiplicity of documentary sources of information (monitoring data, documents, statistical data) and "live" data (stakeholders, beneficiaries, key subjects and users of the SovraCUP service), investigated using specific survey tools and methodologies, such as a survey with the beneficiaries of the OT1 and OT2 projects, interviews in depth to stakeholders and key subjects, case studies, network analysis and a survey with the recipients of the SovraCUP project of the Sicilian Region.

More specifically, the evaluation was able to make use of the data and information collected following the carrying out of the following operations:

- **desk analysis of monitoring data and all documents relating to the OP ERDF Sicilian Region 2014-2020** and to the financed operations (Operational programme, Eligibility requirements and selection criteria for operations, Annual implementation report, Methodological document on indicators (result and output) and performance framework of the OP - version 14 July 2023, Summary of the Committee's decisions monitoring of the OP ERDF 2014-2020, Summary framework for reprogramming OP ERDF Sicily 2014-2020, etc.);
- **updating of the theoretical methodological approach of evaluation**, with particular reference to the choice of evaluation criteria, the determination of appropriately updated evaluation questions, the definition of the relationships between indicated phenomena, specific indicators for actions and OS, sources of information, methods and detection tools;
- reconstruction of the logical framework of the Sicily Region ERDF OP (OT1 and OT2), with particular reference to the Thematic Objectives OT1 and OT2 and the related Investment Priorities 1.b, 2.a and 2c and the related specific Objectives OS1.1, OS2 .1 and OS2.2;
- definition of **stakeholder map** (heads of the Regional Planning Department of the Presidency of the Sicilian Region, representatives of the technological districts and companies, of public and private research centers and universities, with particular reference to the ILO and UTT offices and to the Rector's delegates for technology transfer) and subsequent identification of the names and contact details of the stakeholders;

- drafting of questionnaires and survey tools (interview questionnaire for stakeholders; interview questionnaire for beneficiaries of financed projects; survey grid for desk analysis);
- **discussions with the Regional Department** of the Planning (DRP) of the Presidency of the Sicilian Region to organize interviews with stakeholders and subsequent logistical agreements for carrying out interviews with representatives of the Sicilian Region for thematic Objectives 1 and 2;
- construction of the database with the processing of data from the indicators and financed operations, after checking the classifications and quality of the data;
- realization and recording of interviews with representatives of the Sicilian Region for thematic objectives 1 and 2 (June and July 2023);
- preparation of the survey among the beneficiaries (acquisition of the beneficiaries' addresses, preparation of the online questionnaire, reminders);
- analysis of the data collected, processing and provisional evaluation studies;
- drafting of the specific evaluation report (provisional) -27 June 2023;
- **presentation** of the aforementioned provisional evaluation report to the Regional Planning Department (DRP) of the Presidency of the Sicilian Region;
- acquisition of the feedback observations on the aforementioned provisional evaluation report by the Regional Planning Department (DRP) of the Presidency of the Sicilian Region;
- review of the aforementioned report and delivery to the Sicilian Region of the specific provisional evaluation report amended on the basis of the observations received, together with the requested outputs (questionnaire for the stakeholders; questionnaire for the beneficiaries, differentiated for the different actions; survey grid for the study of cases; detection grid for desk analysis);
- realization and recording of in-depth interviews with the main stakeholders involved in the OP, such as managers of the Sicilian Region, representatives of technological districts and companies, public and private research centers and universities (with particular reference to the ILO and UTT offices and to the delegates of the Rector for technology transfer) – August – September 2023;
- construction of the database relating to Action 1.1.5 for the implementation of the network analysis;
- preparation and execution of **survey on the beneficiaries of the interventions** (with CAWI methodology) through a structured closed-ended questionnaire, administered via the web to the beneficiaries and the use of an IT tool for track recording the responses; the survey was carried out in the period 25 July - 5 September 2023 for the beneficiaries of the OT1 projects and in the period 28 August - 25 September 2023 for the beneficiaries of OT2;
- **case study** through the in-depth analysis of practices implemented by the beneficiaries and selected on the basis of a procedure (see the methodological Appendix) which involved the use of the following criteria: the actual impact, i.e. concrete effects relating to the S3 strategy; conditions of practicability, i.e. the presence of success factors that enable the implementation of the various actions envisaged by experience; sustainability conditions with the aim to ensure the continuity of the results of the interventions and their replicability;
- carrying out one **survey** (CAWI) on Sicilian citizens, users of the SovraCUP service of the Sicilian Region carried out in the period 16 - 20 November 2023;
- **analyses** of the data collected;
- processing of the data collected and final evaluation studies;
- meeting with the Steering Group (4 October 2023);
- **reporting** and drafting of a first version of the specific final evaluation report;
- **revision** and drafting of the definitive version of the specific final evaluation report (in Italian and English), which took into account the indications and requests for integration of the Steering Group and the Sicilian Region.

The evaluation and judgments formulated in this Report relating to the effects and impacts of the Sicilian Region ERDF OP 2014-2020 are based on the monitoring data made available to the evaluator and on the primary data and information collected¹ in the period June - November 2023. The evaluation was aimed at understanding whether the implementation of the OP made a difference and provided a contribution to the Regional Strategy

¹ The collection of data needed to answer the evaluation questions illustrated in the methodological appendix was carried out on the basis of specific technical survey tools also presented in the afore mentioned methodological appendix and are attached to the intermediate evaluation report.

for Smart Specialization (S3). In consideration of the available data and the intrinsic difficulty of providing quantitative evidence of the attribution of the effects detected to the OP alone through the classic counterfactual/experimental approach, the evaluation was aimed at identifying the recognized contribution of the OP to the achievement of the results and impacts sign in.

Any further knowledge needs on the impacts and specific causal mechanisms of the Program's effects may hopefully be the subject of future in-depth studies, research or evaluations, also taking into consideration that not all of the OP's interventions had yet been completed at the time the evaluation was carried out² and that in order to evaluate the impacts a suitable period is necessary from the conclusion of the interventions.

Despite the aforementioned limitations, the evaluation made it possible to identify a series of relevant effects, illustrated in the following chapters, which the beneficiaries' representatives, the stakeholders, the key witnesses and the users of the SovraCup service themselves recognized as directly connected to the interventions carried out with the Programme, as well as the main critical and success factors that determined these effects, on the basis of which some strategic and operational indications of policies and interventions useful for future programming were formulated.

From the point of view of the topics covered, this report is structured in accordance with what is required by the technical specifications, and in particular:

- the First Part, after the presentation of an evaluation framework relating to the implementation of the actions of the OP ERDF Sicily 2014-2020 concerning the Thematic Objective 1 and the specific Objective OS1.1, based on the data on the financial, procedural and physical (achievement and result indicators), illustrates the evaluation of the main results and impacts produced by the actions carried out with the support of Axis 1 of the OP ERDF Sicily 2014-2020 and their contribution to the objectives of the S3 Strategy;
- Part Two presents the same evaluation framework for Thematic Objective 2 and the specific Objectives OS2.1 and OS2.2, according to the same structure;
- the Third Part, called "Conclusions and policy indications", contains the summary of the results and impacts of the actions considered of the Thematic Objectives OT1 and OT2 and the related specific Objectives OS1.1, OS2.1 and OS2.2 of the OP ERDF Sicily 2014-2020 and their contribution to achieving the general and specific objectives identified by the Regional Strategy for Smart Specialization (S3). In the same chapter, for each result or impact recorded, strategic indications of actions or intervention policies are provided to obtain an increase in the innovation activity of companies and develop technologies linked to digitalisation in the production areas and in the rural and internal areas of Sicily and, more generally, to ensure greater effectiveness of the ERDF support action for the public and private research system and the development of technologies linked to digitalisation.

² 4 projects of Action 1.1.2 and 7 projects of Action 1.1.5, equal to 3.9% of the total OT1 projects considered, have not yet completed their activities but are in an advanced stage of implementation and approximately a third of the projects relating to OT2 and specifically to Actions 2.2.1 and 2.2.3 (35.6%) are still ongoing.

PART ONE - FINAL EVALUATION AXIS 1

1. Overview of the implementation of SO 1.1 - Axis 1

This chapter provides an overview of the implementation level relating to Axis I and Thematic Objective OT1 of the Sicilian Region ERDF Operational Program 2014-2020, with particular reference to the specific Objective OS1.1, to the related Investment Priority 1.b identified by the OP and the related specific objectives 1, 2 and 3 of the S3 Sicily Strategy.

This reconstruction allows us to represent the functional elements to verify the relationships and causal links between the actions undertaken with the resources used thanks to what was established in the OP ERDF Sicilian Region 2014-2020 (input), the actual achievements (output), the specific results (outcome) achieved and the first impacts obtained.

The following table summarizes the main constituent elements of the Notices for each of the actions covered by this evaluation.

Tab. 1 – Main elements of the calls for action

	<i>Beneficiaries</i>	<i>Max. contribution/cost</i>	<i>Max. duration</i>	<i>Evaluation Criteria</i>	<i>Contribution</i>	<i>OCS usage³</i>
Action 1.1.2	Micro, small and medium enterprises	100k	6 months	<ul style="list-style-type: none"> Innovative services Exploitation of results 	50% (patents and staff) 100% (consulting)	No
Action 1.1.3	Businesses	2M	15 months	<ul style="list-style-type: none"> Sustainability Co-financing Net Researchers 	50% SME 15% Large companies	Yes
Action 1.1.5	Businesses ⁴	4M	30 months	<ul style="list-style-type: none"> Supply chain representativeness Contribution to innovation 	50% (industrial research) 25% (experimental development) ⁵	Yes

Source: IZI processing on Action Notices 1.1.2, 1.1.3, 1.1.5

Based on the information reported, it is possible to highlight some elements of interest for the purposes of this analysis. First of all, in relation to the type of beneficiaries, it can be appreciated how the three actions considered were aimed at financing the different production realities, with an eye to their networking. Furthermore, the different purpose of the three actions (as well as the difference in the beneficiaries identified) also gave rise to a different gradation of the contribution: lower for 1.1.2 and higher for 1.1.5. This was consequently reflected in a different duration of the projects being financed and in the different reportable cost

³ Simplified cost options, limited to general costs.

⁴ Notice 1.1.5 envisages the participation in the partnership of universities, public and private research centers and bodies or alternatively regional technological districts. See Notice 1.1.5, point 2.1 Beneficiaries: "1. Applications can be submitted by Enterprises, as defined in Annex 1 of Regulation 651/2014, and large enterprises, either individually or in association with ATS, ATI, Networks of legal entities (Network-Subject), Networks of legal entities without legal personality (Network-Contract, Partnership Agreement, or other contractual form), in partnership with universities, public and private research centers or bodies or alternatively regional technological districts".

⁵ The co-financing share increased up to 80% in the case of SMEs and research institutions and in relation to dissemination costs; up to 100% in the case of research organisations.

items. A further element that may have played a fundamental role in participation in the tenders appears to be the expected co-financing quota which in the case of Action 1.1.3 was represented by a single rate (different for SMEs and Large Enterprises), while in the case of the two further shares was variable depending on the activity, as well as the beneficiaries. Lastly, it is interesting to underline how Actions 1.1.3 and 1.1.5, limited to general costs, envisaged the use of simplified cost options for the purposes of reporting certain expenses: this option, increasingly supported by the European Commission, to guarantee on the one hand the certainty of the expenditure and on the other hand, the lowering of the error rate of the reported expenses can play a fundamental role in simplifying the burdens on the part of both the beneficiaries and the Administration.

As can be seen from the following table, following a reprogramming process that took into account the needs and requirements of the territory and potential beneficiaries, as well as the implementation possibilities and feasibility of the interventions in the reference period of the ERDF OP⁶, the Sicilian Region has mainly focused, in terms of resources, on the financing of interventions to support the technological advancement of companies (Action 1.1.5), through the financing of pilot lines and functional actions for the development of products and demonstrators and the application of key enabling technologies (KETS), in order to increase the number of companies carrying out R&D activities in collaboration with external parties and consequently to obtain an increase in the innovation activity of companies.

Tab. 2 – OS 1.1 OP ERDF SICILIA 2014-2020 – Financial allocation of the actions

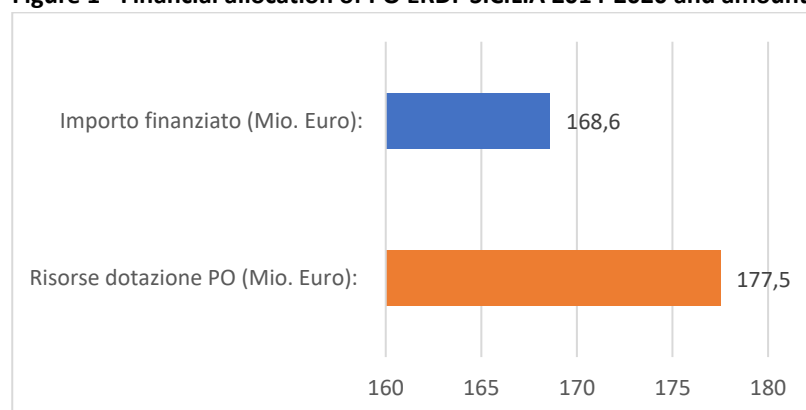
	<i>PO resources (euro)</i>	<i>% of OS 1.1 resources</i>	<i>% of OT 1 resources</i>
Action 1.1.2	17,749,527.00	10.0	4.1
Action 1.1.3	6,056,211.00	3.4	1.4
Action 1.1.5	153,691,511.00	86.6	35.3
OS 1.1	177,497,249.00	100.0	40.8

Source: calculations on data provided by the Sicilian Region - Department of Productive Activities - Service 5.S

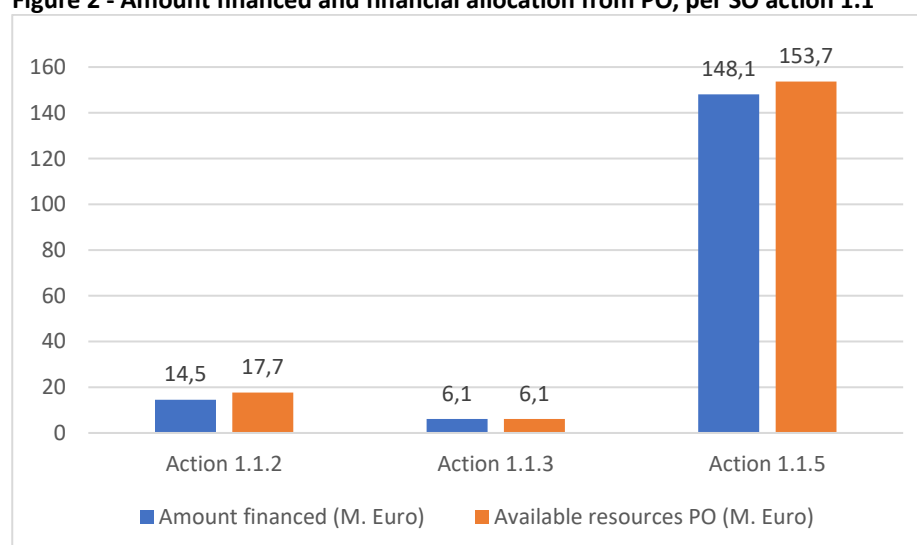
In this regard, however, it should be underlined that in the latest remodulation of the OP presented to the Supervisory Committee in July 2023, a reduction of approximately 11%, from €200 million, was proposed for OS 1.1 "Increase in innovation activities". to €177.5 million, which largely derives from the impossibility of implementing all the interventions selected within the procedure for pilot lines and early product validation and large-scale demonstration actions within the programming cycle.

This choice appears more evident if we consider the amount actually financed compared to the financial allocation of the Operational Programme, which, despite the recent reprogramming, is slightly lower than established (94.9%). As ascertained through specific investigations, this deviation was due to waivers, revocations and savings in the financed operations.

⁶ Since the approval of the S3 Strategy, various Resolutions of the Regional Council have taken place which have redetermined the financial framework of the Axis with a remodulation of the financial allocations of each action, also determined on the basis of the response of the territory: in particular, the resources they were decreased where the response proved to be lower than the initial forecasts and, on the other hand, the resources for Action 1.1.5 were increased which was characterized by a high level of participation on the part of potential beneficiaries. Finally, in July 2023, a further reprogramming of the Sicily ERDF OP became necessary, also in view of its closure, which was presented to the last Supervisory Committee. See Sicilian Region - Department of Productive Activities - Department of Productive Activities - Service 6.S Technical Unit for Coordination of the regional innovation strategy, Implementation and Monitoring Report of the S3 Sicily 2014-2020, Data available as of 31 December 2020, October 2021; Sicilian Region, PO ERDF Sicily 2014/2020. Summary framework on the reprogramming proposal and closure prospects July 2023, 10 July 2023; Sicilian Region, Methodological document on indicators (result and output) and performance framework of the OP ERDF 2014-2020, Annex to Section 2 OP ERDF 2014-2020 Sicilian Region, Version 14 July 2023.

Figure 1 - Financial allocation of PO ERDF SICILIA 2014-2020 and amount of financed projects

Source: calculations on data provided by the Sicilian Region - Department of Productive Activities - Service 5.5

Figure 2 - Amount financed and financial allocation from PO, per SO action 1.1

Source: calculations on data provided by the Sicilian Region - Department of Productive Activities - Service 5.5

In particular, the operations financed, compared to the aforementioned allocation (remodulation of July 2023), amount to:

- for Action 1.1.2, at 14.5 million euros, compared to 17.7 million euros (81.9%);
- for action 1.1.3, at 6.1 million euros, perfectly aligned with the budget (100%);
- for Action 1.1.5, at 148.1 million euros (for a project cost of 182.7 million euros), compared to 153.7 million euros (96.4%).

As can be seen from the following tables, 87.8% of the resources relating to the actions covered by this Axis I evaluation were invested in Action 1.1.5, with the financing of 69 projects equal to 24.5% of financed operations. Overall, Action 1.1.5 resources correspond to 35.3% of all Thematic Objective 1 resources.

Tab. 3 – Resources for projects financed under OP ERDF SICILIA 2014-2020 – OS.1.1 per Action

	Amount Financed		PO Resources		
	My. Euro	%	My. Euro	% of OS 1.1 resources	% of OT 1 resources
Action 1.1.2	14.5	8.6	17.7	10.0	4.1
Action 1.1.3	6.1	3.6	6.1	3.4	1.4
Action 1.1.5	148.1	87.8	153.7	86.6	35.3
OS 1.1	168.6	100.0	177.5	100.0	40.8

Source: calculations on data provided by the Sicilian Region - Department of Productive Activities - Service 5.S

Tab. 4 – Number of projects financed PO ERDF SICILIA 2014-2020 – OS 1.1 per Action

<i>Projects funded</i>	<i>No.</i>	<i>%</i>
Action 1.1.2	200	70.9
Action 1.1.3	13	4.6
Action 1.1.5	69	24.5
Total OS 1.1	282	100.0

Source: calculations on data provided by the Sicilian Region - Department of Productive Activities - Service 5.S

These projects were carried out in partnership between companies and research bodies and structures, for the development of new technologies, products and services, as well as for the technological advancement of companies through the financing of pilot lines and early validation actions of prototypes and demonstrators, with industrial application of key enabling technologies (e.g. micro and nano electronics, biotechnologies applied to human health, nanotechnologies, ICT and advanced materials and manufacturing systems technologies, etc.). In particular, the projects involved the development and testing of technologies whose feasibility had already been previously demonstrated and involved the validation of the technology in a laboratory environment and its demonstration in an industrial environment. The development of prototypes and demonstrators and the industrial-level application of one or more key enabling technologies (KETs) were achieved in proportion to the funded project portfolio.

Otherwise, in Action 1.1.2 functional to supporting businesses for the purchase of advanced knowledge-intensive services (Knowledge Intensive Business Services - KIBS for technological, strategic, organizational and commercial innovation), a number of significant number of projects (200, equal to 70.9% of the projects financed under OS 1.1), for a total of €14,492,567.15, which, as has already been highlighted, was lower than the allocation redetermined following the last remodulation of the OP, equal to €17,749,527.00 (81.9%).

These are investment projects aimed at supporting the acquisition of skills by companies for the start and consolidation of an innovation path, to be implemented also through network projects, also through the financing of patenting costs of innovative ideas, costs related to prototyping and costs related to the development of digital skills (e-skills). To this end, qualified service providers, resident anywhere in the regional, national and European territory, were identified and included in a catalogue, at the end of an investigation process, a catalog accessible and consultable by small and medium-sized Sicilian businesses⁷.

In Action 1.1.3, €6,056,210.90 was invested, financing 13 projects with the aim of supporting the economic valorisation of innovation through experimentation and the adoption of innovative solutions in processes, products and formulas organizational, as well as through the financing of the industrialization of research results.

⁷ These services consisted of six types, namely: initial support for innovation (Service A), support for product and/or process innovation (Service B), support for organizational innovation (Service D) and in support for commercial innovation (Service C), in support for social/environmental innovation (Service E) and in support for specific qualified services (Service F). In particular, SMEs were able to obtain the maximum contribution of €100,000, without establishing a maximum ceiling for investment projects, with aid intensity of up to 100% for consultancy or innovation support activities and 50% for patents and other intangible assets or highly qualified personnel, as per art. 28 of EU Reg. n. 651/2014.

Specifically, the action provided incentives to promote the technological advancement of products, production systems, organizational systems or production diversification, also through the contamination of technologies and their applications, linked to design and planning, placing a maximum ceiling of two million euros for a single project with a maximum intensity of 50% (15% for GIs eligible only in the case of effective collaboration with SMEs) as per art. 29 of EU Reg. n. 651/2014.

Despite the relevance of the expected result, this action was the least supported, in terms of resources allocated, by the Sicilian Region within OS1.1 (3.4%), due to the effect, as will be illustrated later in the paragraph on financial progress, the poor response of the territories in terms of submitting applications, probably due to some characteristics of the Notice, such as the maximum amount for the project and the expected contribution (50% for SMEs and 15% for large companies).

Taking into consideration the thematic areas of the S3 regional strategy, we can observe in the following table that the majority of the funded projects, within the various actions, mainly concerned the following sectors in hierarchical order, quite in line with the priority areas proposed by the Region, consistently with the provisions of the Guidelines on the Smart Specialization Strategy (S3) developed by the European Commission:

- *Smart Cities & Communities*: 122 projects, of which 109 in Action 1.1.2, 10 in Action 1.1.5 and 3 projects in Action 1.1.3;
- *Life Sciences*: 53 projects of which 24 in Action 1.1.2, 26 in Action 1.1.5 and 3 projects in Action 1.1.3;
- *Agri-food*: 44 projects of which 30 in Action 1.1.2, 11 in Action 1.1.5 and 3 in Action 1.1.3;
- *Energy*: 37 projects of which 26 in Action 1.1.2, 10 in Action 1.1.5 and 1 in Action 1.1.3;
- *Tourism Cultural Heritage Culture*: 20 projects of which 10 in Action 1.1.2, 7 in Action 1.1.5 and 3 in Action 1.1.3.

Tab 5—Projects PO ERDF SICILY 2014-2020 –OS. 1.1, according to the scope of the Regional Strategy S3

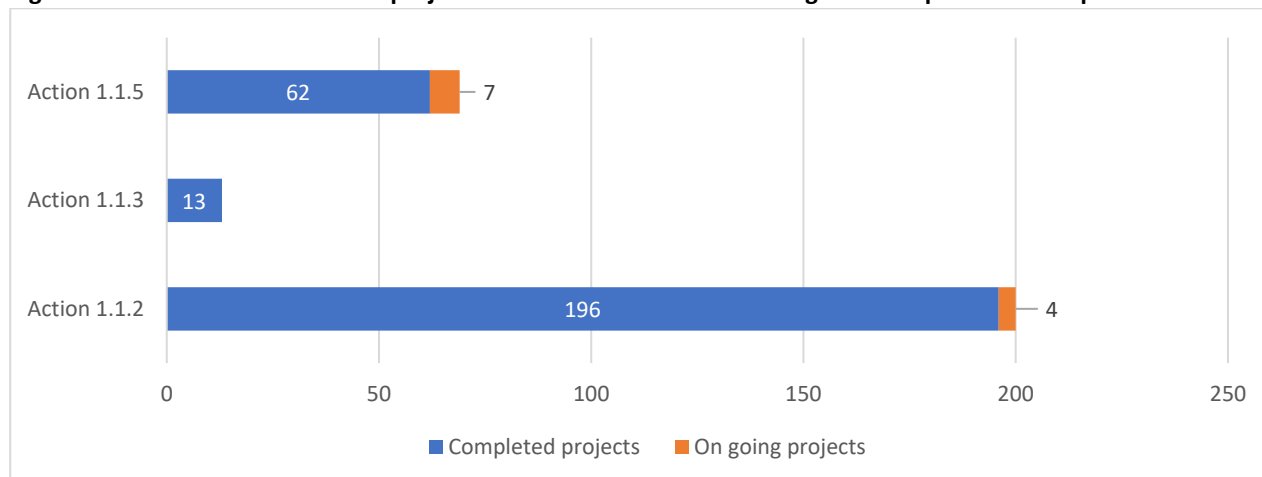
	Action 1.1.2	Action 1.1.3	Action 1.1.5	Total
Agri-food	30	3	11	44
Blue Economy	0	0	5	5
Energy	26	1	10	37
Life Sciences	24	3	26	53
Smart Cities & Communities	109	3	10	122
Tourism Cultural Heritage Culture	10	3	7	20
ND	1	0	0	1
<i>Total</i>	<i>200</i>	<i>13</i>	<i>69</i>	<i>282</i>

Source: calculations on data provided by the Sicilian Region - Department of Productive Activities - Service 5.S

In particular, in the Agri-food sector, the majority of the projects concerned the sub-area Innovation and sustainability of process/product/organization of agri-food production and supply chains (methodologies, materials, machines and systems, services), within the scope of 'Blue Economy the sub-area Innovative design and energy efficiency, in the Energy area the sub-areas Distributed energy and Enabling technologies aimed at reducing energy consumption and energy costs, Management of energy and network services and sustainable territorial planning, new innovative technologies in the field of eco innovation (advanced materials, processes and devices in the energy-environmental and green building fields), in the life sciences field the E-health sub-fields (E-Care, telemedicine, etc.), Methodologies and technologies for diagnosis and Methodologies and technologies for innovative and/or advanced therapy (including Biological Resource Centers, Regenerative Medicine and Gene Therapy, 2D and 3D Scaffolds), in the Smart Cities area the Smart Economy sub-area and in the Tourism, cultural heritage and culture sub-area the Development of digital platforms and web services for tourism and cultural promotion sub-area.

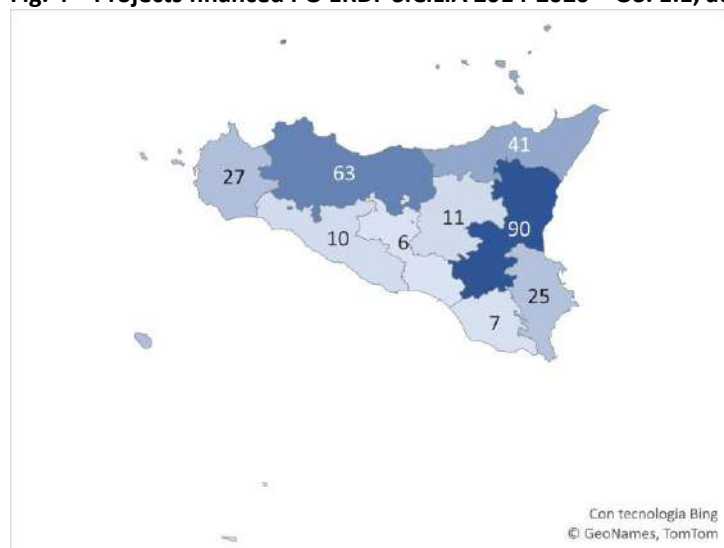
Overall, almost all the projects relating to OS 1.1 were concluded (96.1%) and therefore it was possible to verify the results actually achieved and the effects and impacts obtained (see Chapter 5), while 11 projects (3.9%) are in an advanced stage of implementation and therefore for these it was only possible to verify the results achieved so far and those potentially achievable based on the performance level of the projects and the critical issues encountered.

Fig. 3 – Number of OP ERDF SICILY projects 2014-2020 – OS. 1.1 according to the implementation phase



Source: calculations on data provided by the Sicilian Region - Department of Productive Activities - 5.S Service and Caronte data

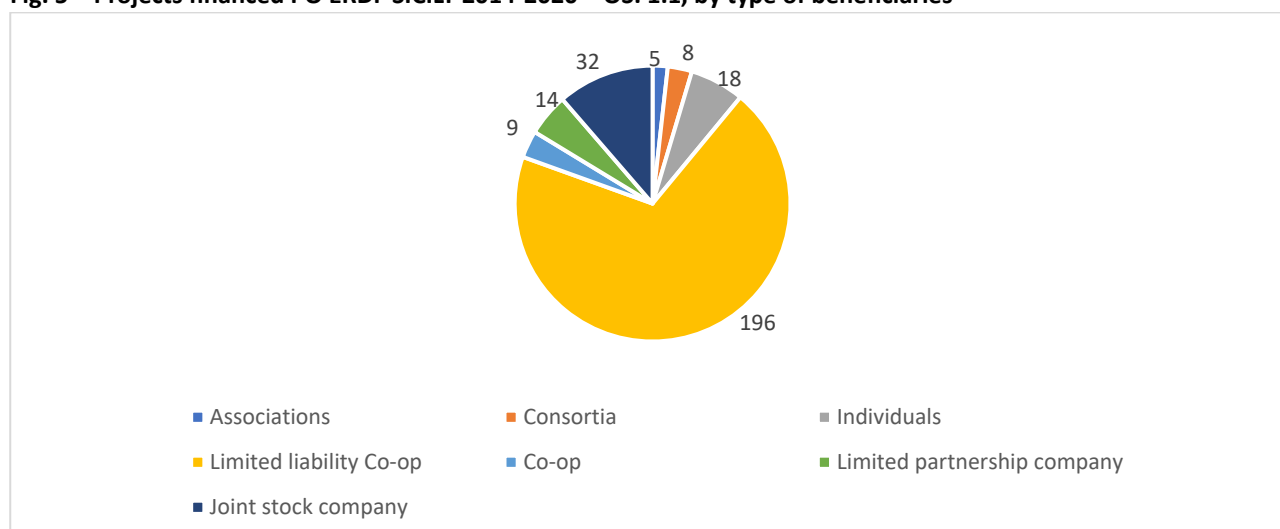
Fig. 4 – Projects financed PO ERDF SICILIA 2014-2020 – OS. 1.1, according to the province



Source: calculations on data provided by the Sicilian Region - Department of Productive Activities - 5.S Service and Caronte data

As can be seen, the majority of projects financed under OT1 are concentrated in the provinces of Catania (90; 31.9%) and Palermo (63; 22.3%) and to a lesser extent in Messina (41; 14.5%), Trapani (27; 9.6%) and Siracusa (25; 8.9%)⁸. As regards the type of beneficiaries, it can be observed that the majority of the operations were financed to limited liability companies (196; 69.5%), followed by joint-stock companies (32; 11.3%).

⁸ The data seems to reflect the shares of Chamber of Commerce registrations present at the provincial level.

Fig. 5 – Projects financed PO ERDF SICILY 2014-2020 – OS. 1.1, by type of beneficiaries

Source: calculations on data provided by the Sicilian Region - Department of Productive Activities - 5.S Service, Caronte data and Open Coesione data

In the following table we can see the slight differences at the action level, among which we note the proportionately greater number of projects of which SpA companies are beneficiaries in Action 1.1.5 (14 equal to 19.2%).

Tab 6 – PO ERDF SICILY Projects 2014-2020 – OS. 1.1, according to the legal form of the beneficiary

	Action 1.1.2	Action 1.1.3	Action 1.1.5	Total
Associations	5	0	0	5
Consortia	3	2	3	8
Individual businesses	17	1	0	18
Limited liability Co-op	140	8	48	196
Co-op	7	1	2	10
Limited partnership company	11	0	2	13
Joint stock company	17	1	14	32
<i>Total</i>	<i>200</i>	<i>13</i>	<i>69</i>	<i>282</i>

Source: calculations on data provided by the Sicilian Region - Department of Productive Activities - 5.S Service, Caronte data and Open Coesione data

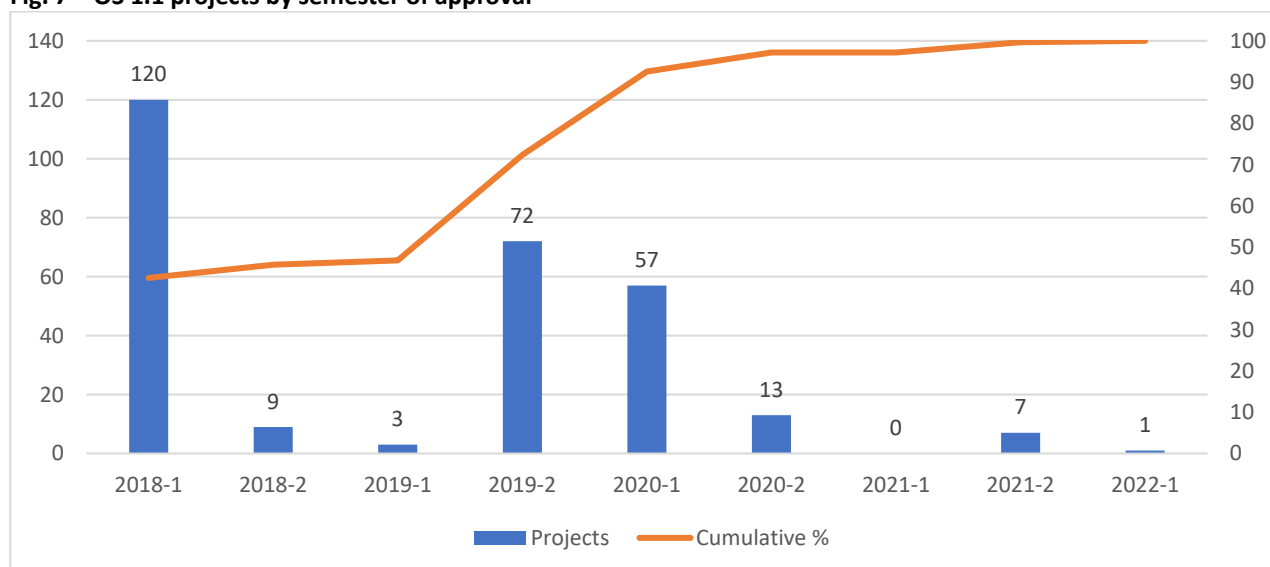
In this regard, it is worth highlighting that, based on Unioncamere data from April 2023, there has been a widespread increase in joint-stock companies (from 1.39% in the province of Enna to 0.55% in the province of Siracusa), while there was a contraction in partnerships (from 1.07% in the province of Caltanissetta to 0.26% in the province of Trapani).

2. Financial advancement

Examining the process of financial advancement of the Operational Program in relation to Specific Objective 1.1, taking into consideration the start dates of the projects, we can note that the majority of the projects were financed between two periods: between the first half of 2018 (120 projects all related to action 1.1.2 equal to 42.5% of all projects) and between the second half of 2019 and the first half of 2020 (129 projects equal to 45.7%). Basically, by mid-2020, 88.2% of the projects had been financed.

This can be clearly seen in the following figure where the projects have been grouped by semester of approval.

Fig. 7 – OS 1.1 projects by semester of approval



Source: calculations on data provided by the Sicilian Region - Department of Productive Activities - 5.S Service and Caronte data

Examining the process of financial progress per action, it can be observed that this trend is confirmed without surprises for Action 1.1.2. In fact, in the first half of 2018, as mentioned, 120 projects were financed, equal to 60.0% of the projects of this action, and in the first half of 2020, a further 57 projects were financed, resulting in financing (including those approved between the second half of 2018 and the first of September 2019) 94.5% of the projects by mid-2020. On the contrary, as regards Action 1.1.3, the approval of 12 of the 13 financed projects took place in the second half of the year of 2019 and only 1 in the second half of 2020. Finally, more or less the same happened for Action 1.1.5 with 60 projects approved in the second half of 2019 (equal to 87.0%), 8 projects financed in the second semester 2020 and only 1 in the second semester 2021.

However, the analysis of the financial progress of the Actions must take into account the subsequent reprogramming of the allocations, which followed one another especially for Actions 1.1.3 and 1.1.5, which are in fact those which reported the greatest variation compared to the initial allocation: the final amount of the allocation for Action 1.1.3 is in fact, equal to just 10.8% of the initial endowment; the final amount of the Action 1.1.5 allocation is equal to 274.1% of the initial allocation; while the final amount of the Action 1.1.2 allocation is equal to 63.3% of the initial allocation.

Tab. 7 – Reprogramming of the financial allocations of the Actions

	<i>Initial equipment</i>	<i>DGR 118/2018 dated 6/03/2018</i>	<i>DGR 141/2019 dated 04/24/2019</i>	<i>DGR 331/2019 dated 09/13/2019</i>	<i>DGR 310/2020 dated 07/23/2020</i>	<i>DGR 315/2023 of 07/27/2023</i>
1.1.2	28,031,133.40	24,500,000.00	22,969,537.00	22,969,537.00	22,969,537.00	17,749,527.00
1.1.3	56,062,268.80	22,058,944.00	16,979,937.00	16,979,937.00	8,337,838.00	6,056,211.00
1.1.5	56,062,268.80	123.162.849,00	123.162.849,00	239.667.241,00	169,351,236.50	153,691,511.00

Source: calculations based on euroinfosicilia.it data

In particular, in relation to the very strong financial reduction of Action 1.1.3, it should be highlighted that the first strong decrease, which occurred just 9 months after the publication of the Notice, corresponds to a poor response from the territories in terms of submitting applications, probably due to some characteristics of the Notice, such as the maximum amount for the project and the expected contribution (50%). It should be noted in this regard that no large company participated in the partnerships of the projects actually implemented in this Action, probably due to the conditionalities set by the Notice itself⁹. According to the criteria set, large companies could only benefit from a contribution equal to 15% of the eligible costs.

In the same way, the fluctuating trend of the allocation of Action 1.1.5 can be assessed, which has had great success in terms of requests, so much so as to absorb not only a good part of the resources of OS 1.1, but also of others of the OT1 (DGR 331/2019 of 13/09/2019). Part of the allocation was then released in the following reprogrammings (in particular DGR 310/2020 of 07/23/2020), also due to the fact that the prolongation of project approval times made some partnerships lose interest in participating in the 'Notice, and sometimes the same participation requirements.

The following table illustrates the summary of the progress of expenditure of the actions relating to SO 1.1.

Table 8 - Progress of spending Actions of OS 1.1 of the OP ERDF SICILIA 2014-2020

	<i>PO financing</i>	<i>Committed expense</i>	<i>% committed expenditure / PO financing</i>	<i>Payments</i>	<i>% payments / committed expense</i>
Action 1.1.2	17,749,527.00	14,492,567.15	81.7	14,134,220.56	97.5
Action 1.1.3	6,056,211.00	6,056,210.90	100.0	1,971,666.22	32.6
Action 1.1.5	153,691,511.00	148,054,054.39	96.3	61,846,976.42	41.8
<i>Total</i>	<i>177,497,249.00</i>	<i>168,602,832.44</i>	<i>95.0</i>	<i>77,952,863.20</i>	<i>46.2</i>

Source: calculations on data provided by the Sicilian Region - Department of Productive Activities - Service 5.S

As can be seen, the expenditure committed by the 200 projects financed under Action 1.1.2 was 14,492,567.15 euros, equal to 81.7% of what was established by the Operational Program of the ERDF SICILY 2014-2020 (last remodulation), while the receipted expenditure corresponding to the payments made was 14,134,220.56 euros, equal to 97.5% of the committed expenditure and 79.6% of the OP financing.

On the contrary, the expenditure committed by the 13 projects financed under Action 1.1.3, i.e. 6,056,210.90 euros, corresponds to the totality of the provisions of the OP, while the payments made amounted to 1,971,666.22 euros, corresponding to only 32.6% of the committed expenditure and what was planned by the OP.

Finally, the expenditure committed by the 69 projects financed under Action 1.1.5 was 148,054,054.39 euros, equal to 96.3% of what was established by the OP, while the payments made were 61,846,976.42 euros, corresponding to only 41.8% of the committed expenditure and 40.2% of what was established in the OP.

⁹ The Notice was aimed at SMEs and the participation of large companies in the temporary grouping or network contract was admissible under the conditions set out in par. 2 of the Art. 29 of Reg. 651/2014, which states: "Aid to large companies is compatible only if these companies actually collaborate with SMEs in the context of the subsidized activity and if the SMEs involved support at least 30% of the total eligible costs".

Overall, the progress of the expenditure of OT 1 of the OP records a clear delay in payments made which corresponds, for the actions as a whole, to just under half, i.e. 46.2% of the amount committed and just 43.9% of what was planned in the OP, moreover several times and also recently remodulated.

This delayed progress of spending, particularly relevant in Action 1.1.3, was certainly affected, as also documented by the latest Implementation Report of the ERDF OP 2014-20 and confirmed by the beneficiaries, by the presence of the state of emergency connected to the pandemic which had a significant impact on spending levels at least until 2021. These delays were particularly significant also in consideration of the numerous projects (especially Action 1.1.3) approved in the second half of 2019 and whose start date coincided precisely with the period of the health emergency.

In particular, in the aforementioned Report, it is clearly explained how the effects of the pandemic recorded in 2020 were reflected in 2021, mainly taking into consideration:

- the delays that public infrastructures have suffered in the concrete start-up and execution phase of the works;
- of the uncertainties detected by the business system, in the absence of certain prospects, in the implementation of the investments activated or in the process of being activated within the Programme.

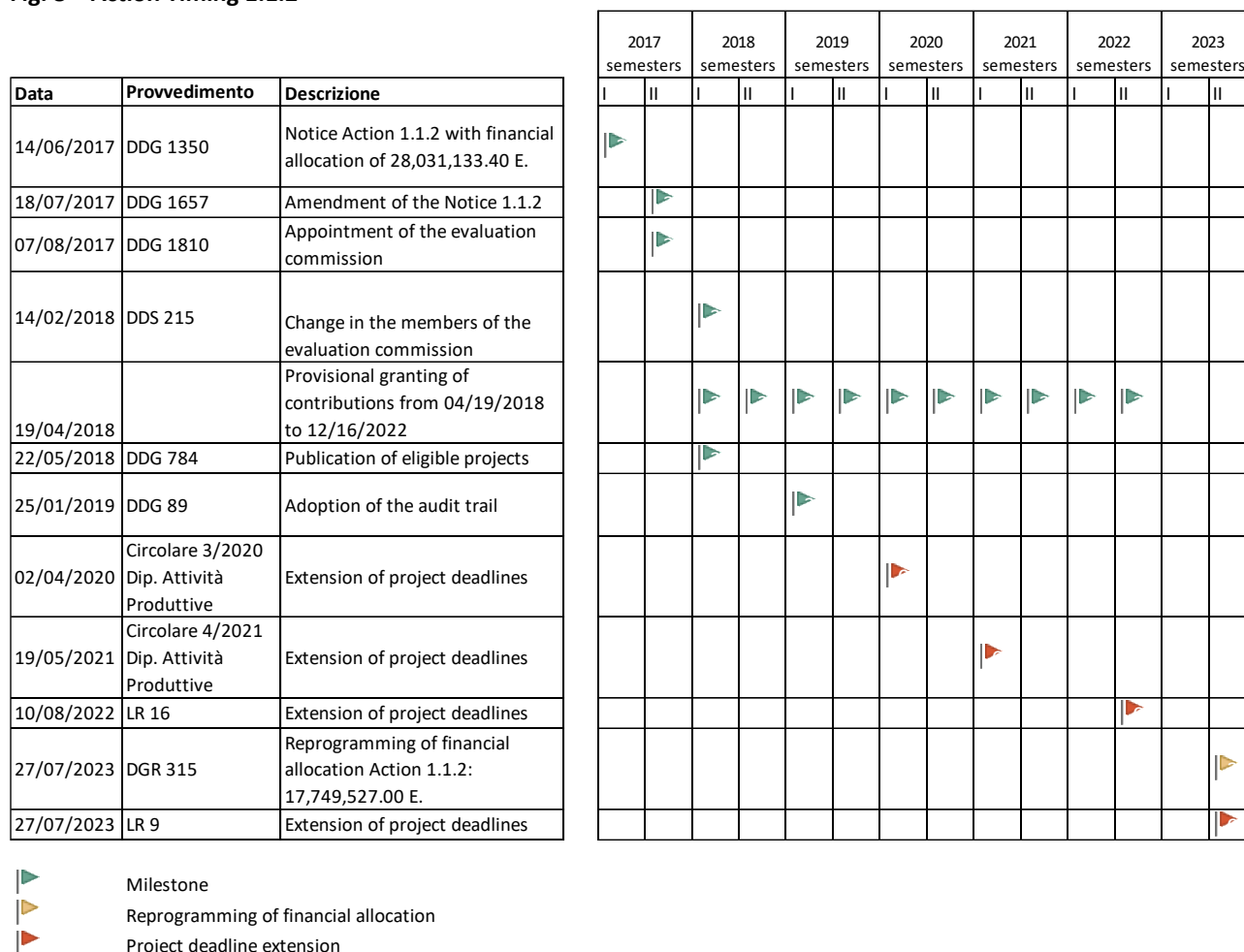
As will be seen in chapter 5, the beneficiaries and stakeholders interviewed also underlined how Covid-19 has put a strain on the possibility of carrying out what was planned, slowing down the implementation of activities, especially in the medical, healthcare, agri-food and tourism fields. , with inevitable delays in the procurement and supply of raw materials and IT equipment and electronic components, with the consequent increase in costs. This situation was aggravated by the subsequent economic crisis resulting from the Russian-Ukrainian conflict. However, the stakeholders and beneficiaries themselves interviewed indicated additional reasons that slowed down the implementation performance. In particular, the other main critical issues encountered by the beneficiaries of the projects were financial critical issues and critical issues concerning the selection procedures of the implementing entities and/or collaborators, as well as administrative critical issues of the interventions (reporting, monitoring, procurement, etc.) or procedural (complexity of bureaucratic procedures, response times to requests for substantial extension of activities, etc.), to which are added those of a management nature of the projects (organisation, activation of human resources, respect for deadlines, etc.) and attributable to the functioning of partnerships and networks.

3. Procedural progress

The evaluation made it possible to reconstruct the main stages that characterized the Actions financed under the OS. The following figures show the Gantt diagram of the three Actions, through which it is possible to obtain an overall picture and a representation of the difficulties and delays that characterized some procedures, on the basis of which it is possible to formulate a judgment regarding the procedural efficiency.

Regarding Action 1.1.2, no particular difficulties emerged, given the high number of applications received and the time required for their evaluation. The granting of contributions began within the first half of 2018, 8 months after the publication of the Notice.

Fig. 8 – Action Timing 1.1.2



Source: Elaborations on Euroinfosicilia.it data

The situation of Action 1.1.3 is substantially different, as it suffered, together with Action 1.1.5, from the subsequent steps in the implementation of the Caronte monitoring system, which delayed the operations for uploading data to the platform. It can be seen in the following figure that the notice had a postponement of the deadlines for submitting applications and that the granting of contributions began in the second quarter of 2019, more than two years after the publication of the Notice. The Action procedure was affected by reprogramming of the financial allocation and extensions essentially due to the pandemic.

Fig. 9 – Action Timing 1.1.3

Date	Measure	Description	2017 semesters		2018 semesters		2019 semesters		2020 semesters		2021 semesters		2022 semesters		2023 semesters	
			I	II	I	II	I	II	I	II	I	II	I	II	I	II
14/06/2017	DDG 1348	Notice Action 1.1.3 with financial allocation of 56.062.268,80 E.	▶													
28/09/2017	DDG 2183	Postponement of deadlines for submitting applications - Notice of Action 1.1.3		▶												
13/11/2017	DDG n. 2615	Appointment of Evaluation Commission		▶												
06/03/2018	DGR 118	Financial allocation Action 1.1.3: 22.058.944,70 E.			▶											
25/06/2018	DDG n. 996	Appointment of new Evaluation Commission			▶											
19/07/2018	DDG 114	Publication of eligible applications (33)				▶										
24/04/2019	DGR 141	Reprogramming of financial allocation Action 1.1.3: 16.979.937,00 E.					▶									
03/04/2019	DDG n. 1225	Approval of the provisional ranking of admitted and financeable companies					▶									
07/08/2019	DDG n. 2530	Approval of the final ranking of admitted and financeable companies						▶								
23/10/2019		Provisional granting of contributions from 23/10/2019 to 30/11/2021						▶	▶	▶	▶	▶				
05/11/2019	DDG 3311	Edit audit trail						▶								
02/04/2020	Circolare 3/2020 Dip. Attività Produttive	Extension of project deadlines							▶							
23/07/2020	DGR 310/2020	Financial allocation Action 1.1.3: 8.337.838,00 E.										▶				
19/05/2021	Circolare 4/2021 Dip. Attività Produttive	Extension of project deadlines										▶				
18/11/2021	DDG 2565	Final ranking of admitted companies (18)										▶				
25/03/2022	Circolare 1/2022 Dip. Attività Produttive	Extension of project deadlines												▶		
10/08/2022	LR 16	Extension of project deadlines													▶	
27/07/2023	DGR 315	Reprogramming of financial allocation Action 1.1.3: 6.056.211,00 E.														▶
27/07/2023	LR 9	Extension of project deadlines														▶



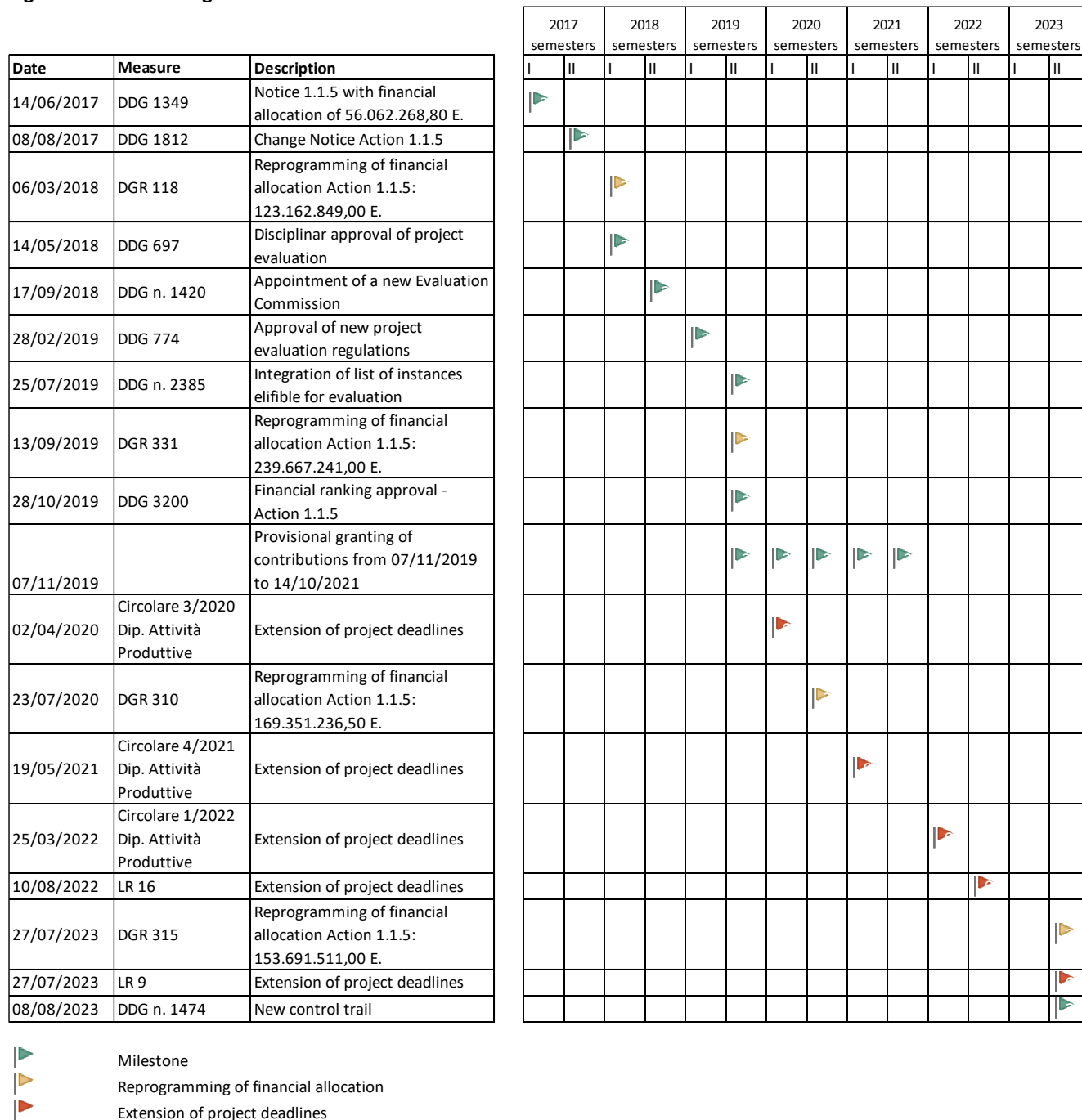
▶ Milestone
 ▶ Reprogramming of financial allocation
 ▶ Extension of project deadlines

Source: Elaborations on Euroinfosicilia.it data

Action 1.1.5 suffered from significant delays in defining the definitive ranking, mainly due to the characteristics of the selection procedure which involved the evaluation of the project by experts who supported the commission. The Administration's choice was in fact not to form a commission but to appoint thematic experts and economic experts for each of the projects to guarantee the impartiality and objectivity of the evaluation. As mentioned, the Action was also affected by the complexities and adaptations of the Caronte monitoring system.

Considering that the evaluation was not carried out by a single commission but by several experts, the administratorstration intended to ensure that they worked as coherently as possible with each other, with common criteria, with a consequent increase in evaluation times. Action 1.1.5 was also affected by reprogramming of the financial allocation and extensions.

Fig. 10 – Action Timing 1.1.5



Source: Elaborations on Euroinfosicilia.it data

The following figure allows you to comparatively appreciate the timing of OS 1.1 warnings. As can be seen, Action 1.1.2 (one-stop procedure) had a fairly rapid progress in granting contributions, which then continued until the end of 2022. On the contrary, due to the reasons mentioned above, the other two actions were granted grants starting from the second half of 2019. It is worth remembering here that the pandemic began at the beginning of 2020.

Fig. 11 – Essential timing Actions 1.1.2, 1.1.3 and 1.1.5

Description	2017 semestri		2018 semestri		2019 semestri		2020 semestri		2021 semestri		2022 semestri		2023 semestri	
	I	II	I	II	I	II	I	II	I	II	I	II	I	II
Action 1.1.2														
Public notice	14/06/2017													
Eligible requests			13/08/2018											
Granting of contributions			from 19/04/2018 to 16/12/2022											
Action 1.1.3														
Public notice	14/06/2017													
Project ranking						07/08/2019								
Granting of contributions						from 23/10/2019 to 30/09/2021								
Action 1.1.5														
Public notice	14/06/2017													
Project ranking						28/10/2019								
Granting of contributions						from 07/11/2019 to 14/10/2021								

Source: Elaborations on Euroinfoscilia.it data

If we observe the procedural progress per action, taking into consideration the start and end dates of the projects, we can see that all the projects of Action 1.1.3 are now concluded, the same is true for almost all 200 projects of the Action 1.1.2, although there are 4 projects still underway, while as regards Action 1.1.5, 62 projects have been concluded (89.8%) and 7 have not yet completed their activities but are in a phase advanced implementation (10.1%).

Tab. 9 - Number of projects according to the implementation phase by type of Action

	<i>Action 1.1.2</i>	<i>Action 1.1.3</i>	<i>Action 1.1.5</i>	<i>Total</i>
Projects in progress	4	0	7	11
Completed projects	196	13	62	271
Total	200	13	69	282

Source: calculations on data provided by the Sicilian Region - Department of Productive Activities - 5.S Service and Caronte data

When examining the timing of project implementation, several factors must be taken into account, linked to the warnings and measures related to the pandemic. First of all, the tenders provided for a different maximum duration in months for the three actions in question, namely:

- Action 1.1.2, 6 months;
- Action 1.1.3, 15 months;
- Action 1.1.5, 30 months.

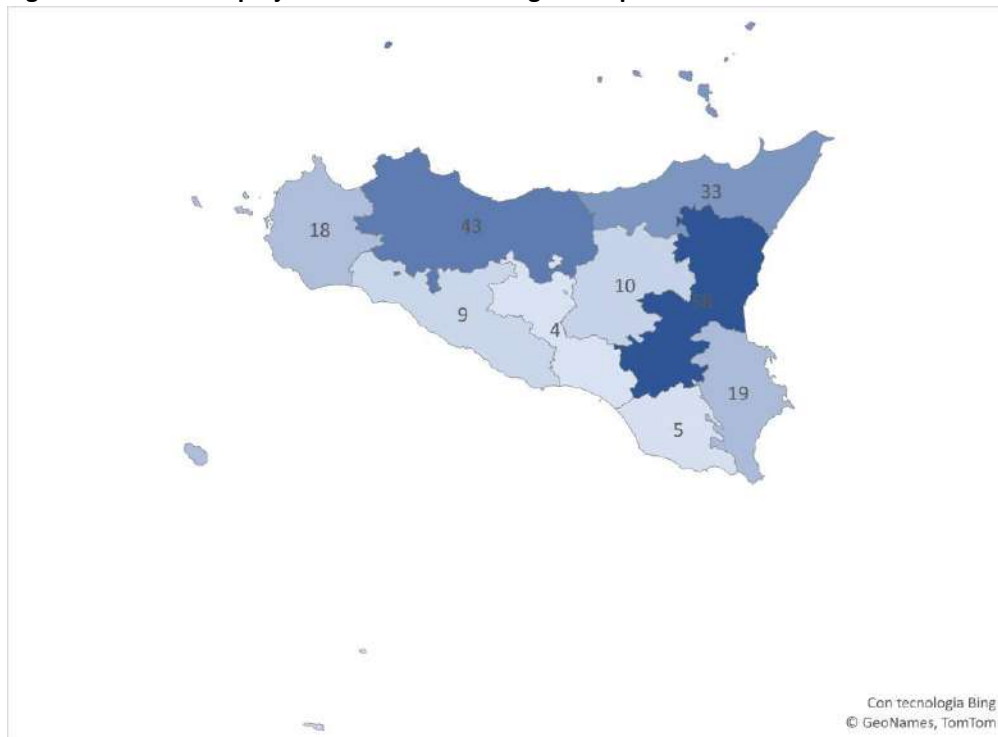
Furthermore, in the notices of Actions 1.1.3 and 1.1.5 the possibility of an extension of 3 months was foreseen, while in the notice of Action 1.1.2 this possibility was equal to one month.

With regard to the specific conditions dictated by the pandemic, it must be considered that a further 82 days starting from the final deadline for completion were granted erga omnes to all projects expiring after 06/21/2022 through Circular 1/2022 (which followed the circulars 3/2020 and 4/2021), which took note of the objective difficulties encountered by the beneficiaries in implementing the projects due to the extraordinary conditions posed by the pandemic and tried to mitigate their effects on the implementation of the projects.

Subsequently, LR 16 of 10/08/2022, art. 14, set the deadline for the projects at 06/30/2023. The same article 14 was then modified with the subsequent LR 9 of 27/7/2023 art. 40, which brought the deadline to 09/30/2023. Moving on to examine the territorial distribution of the operations financed per action, a concentration in the provinces of Catania and Palermo is confirmed in Action 1.1.2 and Action 1.1.5: in particular, in Catania there are 58 projects for Action 1.1. 2 (29.0%) and 26 projects for Action 1.1.5 (37.7%), while there are 43 projects financed

in Palermo for Action 1.1.2 (21.5%) and 17 projects for Action 1.1.5 (24.6%). However, a significant portion of projects was financed in the provinces of Messina (respectively 33 projects in Action 1.1.2, equal to 16.5%, and 7 in Action 1.1.5, equal to 10.1%) and Trapani (18 projects in Action 1.1.2, i.e. 9.0% and 7 in Action 1.1.5, equal to 10.1%). In the province of Siracusa, 19 projects of Action 1.1.2 (9.5%) and 5 of Action 1.1.5 (7.2%) were financed.

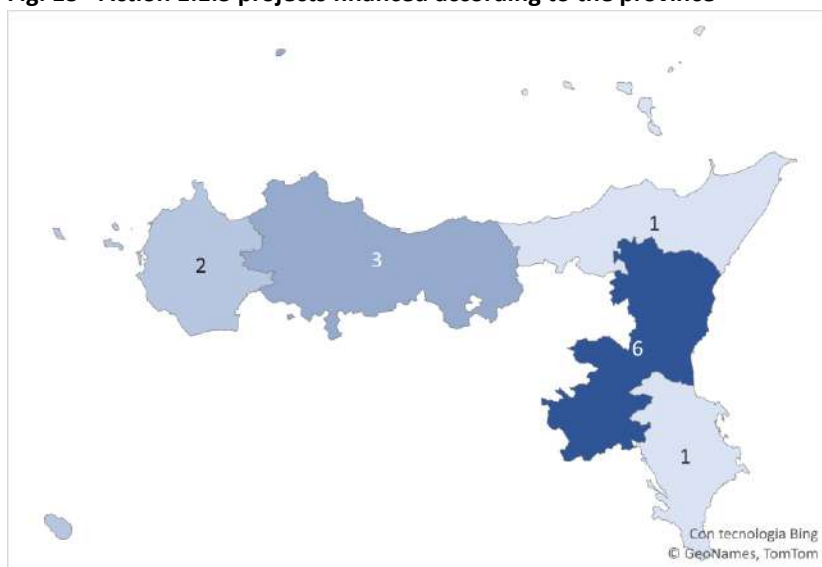
Fig. 12 - Action 1.1.2 projects financed according to the province



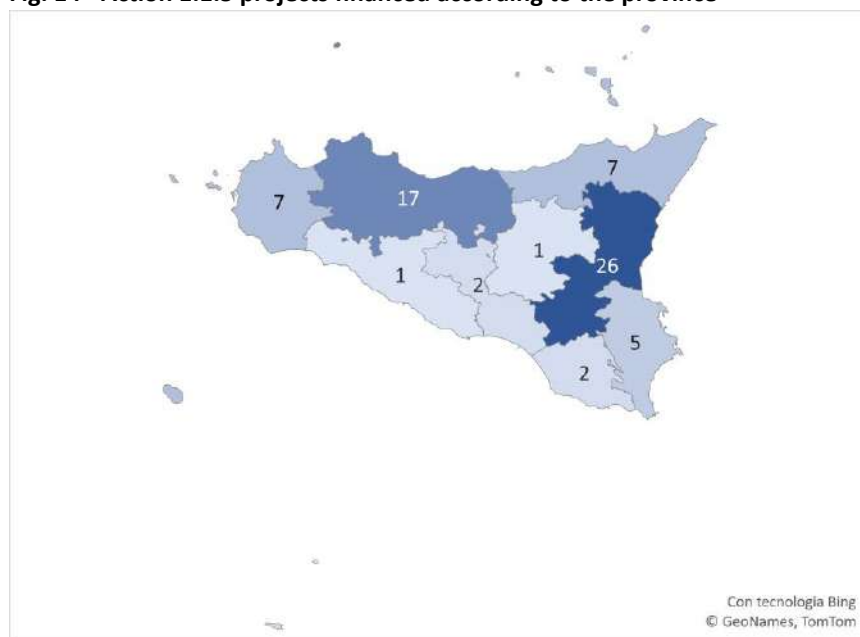
Source: calculations on data provided by the Sicilian Region - Department of Productive Activities - 5.S Service and Caronte data

Regarding Action 1.1.3, the majority of the funded projects (6 projects; 46.1%) were carried out in the province of Catania (6; 46.2%). Followed by Palermo (3 projects; 23.1%) and Trapani (2 projects; 15.4%).

Fig. 13 - Action 1.1.3 projects financed according to the province

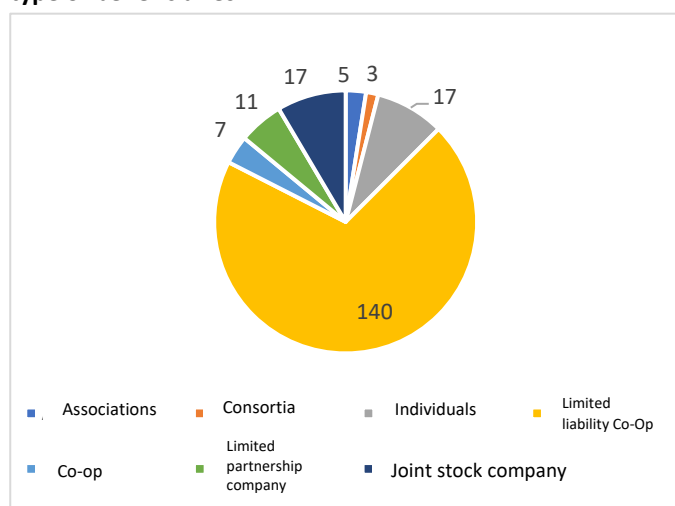
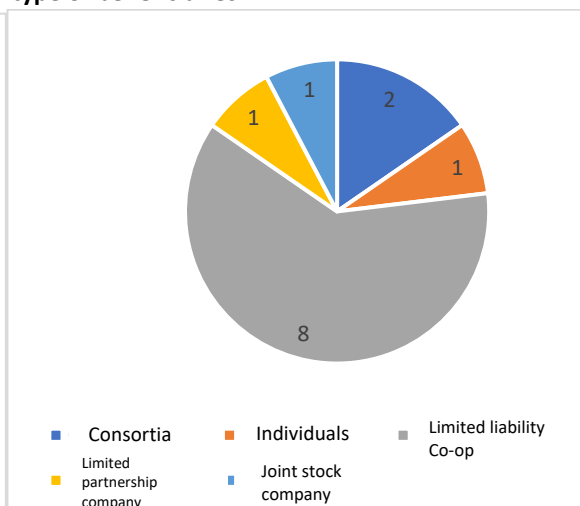


Source: calculations on data provided by the Sicilian Region - Department of Productive Activities - 5.S Service and Caronte data

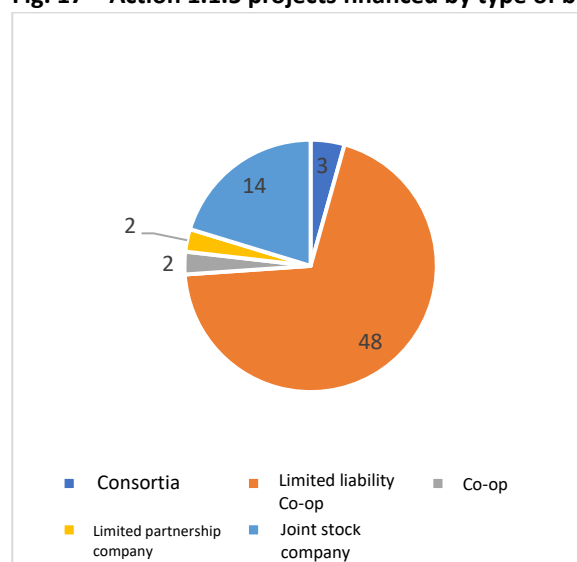
Fig. 14 - Action 1.1.5 projects financed according to the province

Source: calculations on data provided by the Sicilian Region - Department of Productive Activities - 5.S Service and Caronte data

Finally, as regards the type of beneficiaries, while for all actions a preponderance of limited liability companies is confirmed, respectively owners of 140 projects in Action 1.1.2 (71.3%), 8 projects in Action 1.1. 3 (61.5%) and 48 in Action 1.1.5 (69.6%), there is a greater number of projects of which SpA companies are beneficiaries in Action 1.1.5 (14 equal to 20.3%) and consortia in action 1.1.3 (2 equal to 15.4%).

Fig. 15 – Action 1.1.2 projects financed for type of beneficiaries**Fig. 16 – Action 1.1.3 projects financed for type of beneficiaries**

Source: calculations on data provided by the Sicilian Region - Department of Productive Activities - 5.S Service, Caronte data and Open Coesione data

Fig. 17 – Action 1.1.5 projects financed by type of beneficiaries

Source: calculations on data provided by the Sicilian Region - Department of Productive Activities - 5.S Service, Caronte data and Open Coesione data

4. Physical advancement

In the following table you can appreciate the physical progress of the actions being evaluated linked to the OS 1.1 objective, on the basis of the mandatory common output indicators used in the 2014-2020 ERDF OP in the Sicilian Region, whose expected values have recently been remodulated in following the reprogramming of the July 2023 OP¹⁰.

In general, given that the first projects were approved in the first half of 2018, it can be observed that the first constructions were obviously carried out starting from 2018 and the greatest deviations were recorded in 2021, precisely due to the fact that almost all of the projects were funded by the first half of 2020.

¹⁰ Sicilian Region, Methodological document on indicators (result and output) and performance framework of the OP ERDF 2014-2020, Annex to Section 2 OP ERDF 2014-2020 Sicilian Region, Version 14 July 2023.

Tab 10 – Physical progress of the common and specific output indicators relating to OS 1.1 of the OP ERDF 2014 – 2020 Sicilian Region

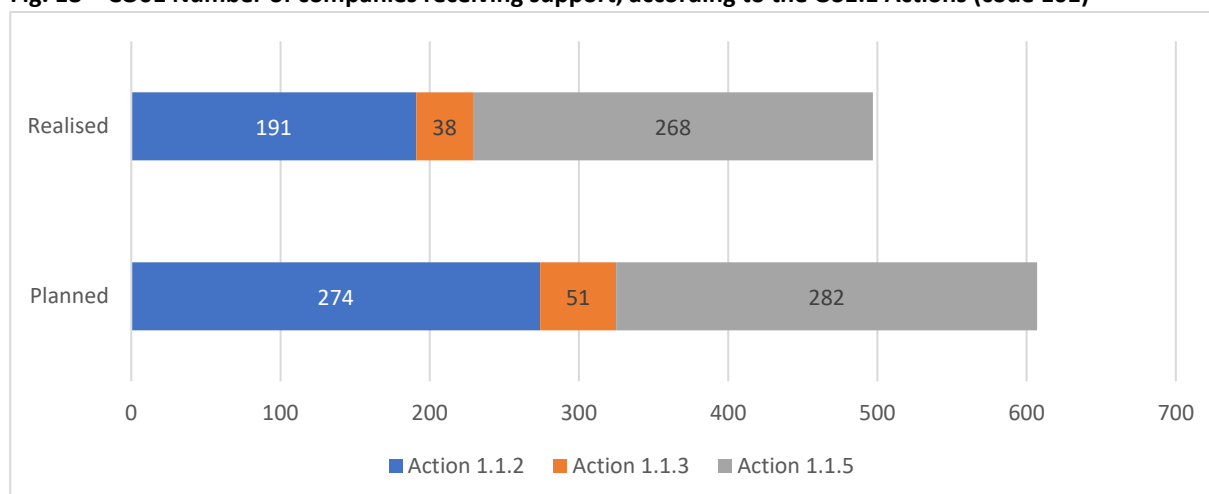
Indicators (a)	Expected value PO (b)	Expected value Operations (c)	Measured value Operations (d)	% compared to expected value PO (d/bx 100)	% compared to expected value Operations (d/cx 100)	2014	2015	2016	2017	2018	2019	2020	2021	2022
CO01 Number of businesses receiving support	538	607	497	92.2	81.7	0	0	0	0	56	133	167	492	496
CO26 Number of companies that cooperate with research institutes	296	282	268	90.5	95.0	0	0	0	0	0	19	19	268*	268
CO29 Number of companies benefiting from support aimed at introducing new products for the company	242	325	229	94.6	70.5	0	0	0	0	56	108	147	223	228

* CO26 data for the year 2021 remodulated in 2021

Source: Attachment to Section 2 OP ERDF 2014-2020 Sicilian Region, Version 14 July 2023

The companies that received support were slightly fewer (92.2%) than what was recently established in the latest version of the Operational Programme, which - it is worth remembering - however significantly reduced the expected value of the indicator, setting it at 538 companies incurred (previously it was 912). Furthermore, it can be noted that so far 497 companies have been supported, equal to 81.7% of those scheduled in the financed projects.

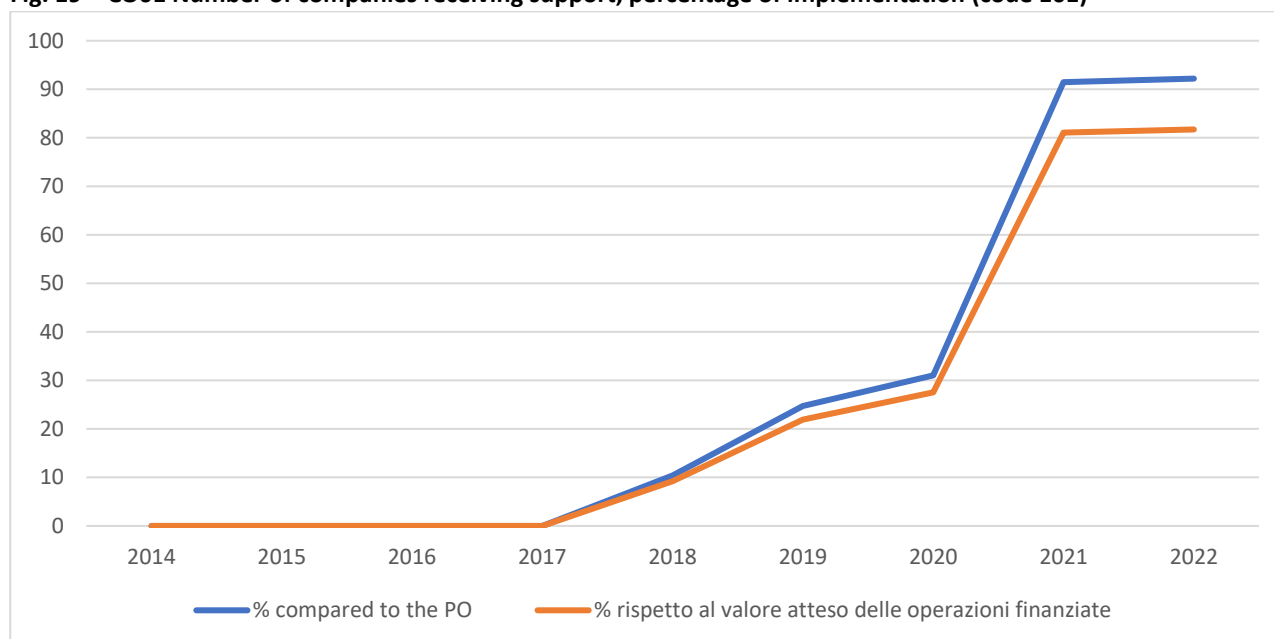
Fig. 18 – CO01 Number of companies receiving support, according to the OS1.1 Actions (code 101)



Source:

Attachment to Section 2 OP ERDF 2014-2020 Sicilian Region, Version 14 July 2023

Fig. 19 – CO01 Number of companies receiving support, percentage of implementation (code 101)



Source: Attachment to Section 2 OP ERDF 2014-2020 Sicilian Region, Version 14 July 2023

In the previous figure, we can see the delay that is now impossible to fill in Action 1.1.2, given that according to the data of the CO01 indicator, 191 companies were supported compared to the 274 foreseen by the financed projects. In reality, 200 companies were supported, corresponding to the 200 projects financed, but the delay compared to the 274 companies expected remains unbridgeable. Less noticeable is the gap produced within Action 1.1.3 (38 companies supported compared to the 51 expected, equal to 74.5%) and Action 1.1.5 (268 companies supported out of 282 expected, equal to 95.04%).

However, great impetus was given to support for the development of connections and synergies between companies and research centres, foreseen for Action 1.1.5. In fact, 90.5% of the OP target relating to companies cooperating with research institutes has been achieved (90.5%).

Tab. 11 – CO26 Number of companies that cooperate with research institutes, according to the OS1.1 Actions (code 126)

	<i>Planned Value projects</i>	<i>Realized value projects</i>
Action 1.1.2	0	0
Action 1.1.3	0	0
Action 1.1.5	282	268
<i>Total</i>	<i>282</i>	<i>268</i>

Source: Attachment to Section 2 OP ERDF 2014-2020 Sicilian Region, Version 14 July 2023

Many companies have received support to introduce products that are new to the company, especially in the context of Action 1.1.2 (191 companies) and to a lesser extent in Action 1.1.3 (38 companies). Overall, 94.6% of the target established by the OP was achieved (229 compared to 242) and 70.5% of the cumulative expected value (325) of the financed projects. Also, in this case the non-optimal performance was influenced by the lack of support for all the companies envisaged in Action 1.1.2.

Tab. 12 – CO29 Number of companies benefiting from support to introduce products that are new for the company, according to the OS1.1 Actions (code 129)

	<i>Planned Value projects</i>	<i>Realized value projects</i>
Action 1.1.2	274	191
Action 1.1.3	51	38
Action 1.1.5	0	0
<i>Total</i>	<i>325</i>	<i>229</i>

Source: Attachment to Section 2 OP ERDF 2014-2020 Sicilian Region, Version 14 July 2023

The following table has as its object the physical advancement of the mandatory common result indicator linked to the OS 1.1 objective in the 2014-2020 ERDF OP in the Sicilian Region and whose target was recently reduced in the latest reprogramming of the July 2023 OP by 67% to 59%, assuming that the resources allocated by the ERDF to the R&D policy, increased compared to the 2007-2013 period, were able to produce a relative increase of approximately 5% in companies' collaboration activities, compared to the baseline of the 56.4%.

Tab 13 – Physical progress of the result indicator relating to OS 1.1 of the OP ERDF 2014 – 2020 Sicilian Region

IR	PO expected value	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Companies that have carried out R&D activities in collaboration with external parties (%)	59.0	56.4	69.2	71.7	59.0	47.6	40.1	38.8	39.4	41.0	41.0

Source: elaboration on Istat data <https://www.istat.it/it/archivio/16777>

First of all, it should be noted that the data reported in the table differ for the years from 2018 compared to those reported in the Annual Implementation Report, as they were verified and corrected on the basis of those of the Istat territorial indicators (<https://www.istat.it/it/archive/16777>).

With reference to the table, one cannot fail to notice a strong fluctuation in the data relating to the percentage of companies that have carried out R&D activities in collaboration with external parties, according to which, starting from the reference value of 56.4% in 2012, there would have been a peak in 2014 equal to 71.7% (+15.3), the substantial return to the initial situation in 2015 (59%), a decrease in 2016 (47.6%), continued in the following years, in which the value of the indicator stood at around 40%, with a loss of 15 points on the 2012 reference value.

It should therefore be noted the difficulty in giving an interpretation to this trend, which is accompanied by the more general one regarding the possibility of establishing a causal link between the aforementioned variations and the interventions financed under the OP ERDF 2014 - 2020 Sicilian Region, given that the result measured by the aforementioned statistical indicator is also connected to further initiatives and interventions financed with funds other than the ERDF and above all that the majority of the interventions financed by the ERDF OP were actually carried out only after 2020 and necessarily did not have the possibility of producing an impact on the values of the aforementioned statistical indicator last recorded in 2021.

Also in consideration of the aforementioned difficulty in drawing evaluative conclusions on the impact attributable to the Programme, based on the variations in the aforementioned statistical indicator relating to the percentage of "companies that have carried out R&D activities in collaboration with external parties" and more generally of the difficulty to evaluate the impact of the OP's actions based on the use of counterfactual experimental methods, we opted, as envisaged in the specifications, for a Theory Based evaluation to identify the effects that can be linked to the implementation of the 2014-20 ERDF Programme. As illustrated in the methodological appendix, this evaluation was carried out using a mixed methods approach which made it possible to identify the effects that the beneficiaries' representatives, the stakeholders and the key witnesses recognized as connected to the interventions carried out with the Program and to the events that followed during the implementation of the interventions themselves.

The results of this evaluation on the effects achieved and their contribution to the objectives of the S3 Strategy are presented in the following chapter 5, as well as in chapter 5 of the second part and in the two chapters of the third part focused on the conclusive considerations relating to the results and impacts of the OP and strategic policy indications.

5. Evaluation of the results and impacts achieved

This chapter examines the main results achieved and the impacts obtained, thanks to the implementation of the actions and interventions financed within the scope of the actions considered under the specific Objective OS1.1 relating to the Thematic Objective OT1 and the related Investment Priority 1.b of the OP ERDF Sicily 2014-2020 and its contribution to the achievement of the general and specific objectives identified by the Regional Strategy for Smart Specialization (S3).

The identification of the results and impacts was carried out on the basis of the evaluation approaches adopted, illustrated in the methodological appendix, and the triangulation of all the information collected (desk analysis, stakeholders, beneficiaries, key informants or privileged witnesses), which allowed to reach evaluative conclusions, identifying, as far as possible, the causes or at least the determining factors that hinder or facilitate the implementation of the interventions.

5.1 The significant contribution of the OP ERDF Sicily 2014 – 2020 for the technological, strategic, organizational and commercial development and innovation of businesses

The evaluation conducted made it possible to clearly identify the technological, strategic, organizational and commercial development and innovation of the companies, obtained thanks to the implementation of the 2014-2020 ERDF OP, as a result of the experiments of pilot lines and functional actions to development of new applications, as well as the adoption of new highly innovative prototypes and new technological protocols and production processes which are also innovative and the application of key enabling technologies (KETs).

Such a process, and its relevance for the competitive development of companies, was also recorded by the 2019 Istat census survey, from which it emerged that over 10% of companies had, in the period 2016-2018, invested in innovation (forecasts estimated a doubling of this share in the period 2019-2021). This is even in the face of a generally low level of digital skills. On the other hand, the increase in investments in new technologies, according to the same Istat survey, was identified among the priority objectives by 35.1% of companies (% in line with the national figure).

The effects determined by the PO are therefore triggered in the wake of these processes. In fact, based on the analysis of the OP data, it was possible to document, first of all, a significant technological advancement of the companies obtained thanks to the implementation of the projects carried out. This progress was confirmed by the beneficiaries interviewed through a specific survey¹¹. As can be seen in the following table, in fact, according to 83.3% of the beneficiaries of Action 1.1.5, the contribution of the projects implemented was very significant (37%) and in any case extremely significant (46.3%) for achieve the technological advancement of businesses.

¹¹ See the Appendix – Analysis methodology. In particular, the survey involved the lead companies (69) beneficiaries of Action 1.1.5; the 54 companies that responded to the questionnaire therefore represent 78.3% of the universe.

Tab. 14 - Contribution of projects to the identification of innovative solutions in processes, products, according to beneficiaries – Action 1.1.5

	IT GOES	%
1 – No contribution	0	0.0
2 -	2	3.7
3 –	7	13.0
4 –	25	46.3
5 – Great contribution	20	37.0
Total	54	100.0

Source: IZI, Survey of OP ERDF beneficiaries 2014-2020, July-September 2023

In particular, as regards Action 1.1.5, the main effects concerned technological innovation and the consequent improvement of products and services.

As regards technological innovation, the following box contains brief descriptions of the effects achieved, reported by the beneficiaries of the projects, mostly due to the adoption of highly innovative prototypes and the application of new key enabling technologies (KETs), with particular reference to information and communication technologies (e.g. web application of cloud-integrated technologies, IT technologies and artificial intelligence algorithms, etc.), to advanced materials (e.g. bimetallic and metal-composite hybrid systems, coatings low friction, etc.), nanotechnology, micro- and nanoelectronics and biotechnology (for example applied to human health).

Examples of technological innovation effects reported by beneficiaries

- *Product technological advancement*
- *Technological advancement in feed formulations with high nutritional content*
- *Technical innovations*
- *Positive effect on the technological advancement of the companies involved*
- *The adoption of the prototype contributed significantly to the company's technological advancement*
- *Great contribution provided by the project as it introduced significant technological innovations, leading to significant improvements in efficiency, productivity and competitiveness*
- *Strengthening the technological background in the areas of interest of the project and application of new technologies*
- *Technological improvement at product and process level*
- *An innovative production process has been developed and engineered for a bioactive angular stable internal osteosynthesis device for the surgical district of the humerus*
- *Useful and replicable technological protocols have also been developed in other crops*

Furthermore, a technological improvement was achieved at the level of products and processes, based on experiments with new applications and new technological protocols and production processes which are also innovative. Examples of such improvements are those shown in the following box.

Exemplary cases of technological improvements of products and processes reported by beneficiaries and stakeholders

The LAB@HOME project (Life Sciences sector) is a project aimed at children with autism spectrum disorders and their families and has allowed the development of the innovative HomeLab infrastructure prototypedesigned and created in the form of a proof of concept by CNR-IRIB researchers at the Messina headquarters, in terms of design, ergonomics and adaptability to the real needs of users, both domestic and healthcare, dedicated to the ecological evaluation of behavioral and physiological signs in old age school and preschool education of neurodevelopmental disorders and parent-mediated treatment for children affected by autism spectrum disorders. In particular, HomeLab consists of a structure which, simulating the domestic environment, is able to accommodate the family for the time necessary for: the early ecological identification of biomarkers of the disorder; the collection of behavioral and physiological signs indicative of atypical development; training parents as co-therapists (parent coaching); the implementation of a developmental and cognitive-behavioral approach through evidence-based, intensive and early therapies. The use of the home environment and the active role of parents allow therapeutic techniques to be exploited within normal educational exchanges between parents and children; the presence of non-invasive technology allows therapeutic processes and analyzes to be hidden within a natural environment, in order to create an experience that is more authentic and emotionally safe for users through evidence-based, intensive and early therapies. HomeLab is a simulation of a house equipped with a kitchen, living room, sleeping area, living room equipped with appropriate toys, and a social space. Unlike a usual home, HomeLab hides technologies for personalized assessment of behavior, language and social interaction; rehabilitation technologies such as serious games and social robots, and instrumentation for tele-habilitation, as well as tools for simulating the home environment during the rehabilitation phases at home carried out by parents.

The project Innovative Solutions for High Energy Saving Naval Vessels - SI-MARE (Blue Economy sector), created by the Research Consortium for technological innovation, Sicilia Trasporti navali, commercial e da diporto scarl, in partnership with Intermarine SpA (partner of the NAVTEC district), the CNR and the Universities of Messina, Palermo and Catania, had the effect of applying new technologies and the technological background in the fields of improving energy performance, through the development of advanced composite materials, the development of hybrid bimetallic and metal-composite systems in terms of connection for the use of lightweight superstructures on traditional hulls, as well as the development of functional low-friction coatings for hulls.

The Alimenti Nutraceutica e Salute (Agri-food sector) project, carried out by the Manfredi Barbera & Figli spa company of Palermo (partner of the Agrobiopescia district), in partnership with Nuova Farmaceutica srl of Catania and the University of Palermo, has optimized the oil extraction process with the "2-phase" method, which allowed a qualitative improvement of the oil obtained (higher content of polyphenols) and positive environmental effects deriving from the reduced use of process water and the lack of production of waste water vegetation. The main effects were therefore: greater quality, limited use of important natural resources (drinking water) and elimination of wastewater to be disposed of (vegetation water). A new production process has been developed in perfect harmony with the concept of circular economy.

The DiOncoGen Innovative Diagnostics project (Life Sciences sector), carried out by the Mediterranean Oncology Institute (member of the Biomedical district), had as its main effect the development of a "Decision Support System for Pathology" which, through the use of IT and artificial intelligence (AI) algorithms, is able to provide an interpretation of the images resulting from the scanning of slides and to support the activity of doctors involved in diagnostic and therapeutic processes in oncology for the benefit of the patient.

The project Technological innovations in dairy cattle farms: development of the prototype of an automatic system for monitoring the behavior of cows for the improvement of well-being and productive and reproductive performance - CowTech (Agri-food sector), developed by T.net in partnership with the Di3A (Department of Agriculture, Food and Environment) and the DIEEI (Department of Electrical, Electronic and Computer Engineering) of the University of Catania and with the CoRFiLaC (Dairy Supply Chain Research Consortium) of Ragusa, allowed the prototyping and the development of an automatic system for monitoring the behavior of dairy cattle, shared in a system logic and aimed at improving animal welfare and productive and reproductive performance. Compared to the systems currently on the market, which allow the monitoring of some behavioral parameters of dairy cows, CowTech's technological innovation consists in the creation of a wireless telecommunications infrastructure based on LoRa (Long Range) WAN (Wide Area Network) technology, which allows farmers to be able to monitor and possibly remotely control the information collected by the farm, even if the stable is not covered by the Internet or a mobile data connection. The monitoring and/or control of the farm occurs through the

installation at company level of peripheral devices, both fixed (installed inside the stable) and mobile (worn by the animals). The CowTech prototype has the peculiarity of functioning according to a system logic and not a single company logic. The data acquired by the various companies (Big Data) are in fact collected in a cloud and processed by the system in order to provide an "intelligent" service for all farmers present in the portion of the territory equipped with the infrastructure. This is a technology that can help farmers save an average of 1,000 euros per year for each head of livestock.

The Secesta ViaSafe project (Smart Cities & Communities area), created by PMF in partnership with Aion Lab srl, Ergotronica srl, Gest srl, University of Catania, University of Messina, National Institute of Geophysics and Volcanology, Software Engineering Italia srl has produced an optimization and validation of a network of sensors for monitoring the fallout phenomenon of volcanic ash from Etna in urban and suburban areas and the development of new services for airborne and surface mobility in the metropolitan area of Catania.

The Next generation biobanking (NGB) project: models and operational tools of a new generation biobank as a knowledge hub for precision medicine - BioSpec3 (life sciences sector) has made it possible to develop a new and more advanced software platform for research clinical and translational, web-based and open source, integrating tools and services that support the role of the next generation biobank (NGB - Next Generation Biobank) as a hub of scientific knowledge to support cooperative translational clinical research and the therapeutic strategy to be applied in personalized/precision medicine interventions. In particular, thanks to the BioSpec3 project, a web application of integrated cloud technologies has been created, intended as dedicated to the individual biobank, connected to a federated portal from which it is possible to query a shared database of information put online by the biobanks that decide to join the data federation. With a view to enabling cooperation between new generation biobanks, the prototype is equipped with functions such that it can be used as a management platform for material transfer between biobanks, both incoming and outgoing.

The BrainHeart project (Life Sciences field) proposed an innovative platform to prevent the onset of cardiovascular diseases in the elderly, through a guided psychophysical well-being program. The system is based on wearable hardware for the multi-parametric monitoring of physical and mental health and the implementation of decision support algorithms based on artificial intelligence and the integration of exercises, structured and organized by referring to cognitive techniques behavioral (CBT), such as Mindfulness practices (MCBT) to encourage the proactive role of the elderly in prevention.

The S6 Project (Smart Cities & Communities area), created by Ubique srl in partnership with GRM srls, Tecnosys Italia srl, University of Palermo, University of Catania, Vicosystems srl, has developed a technological platform based on new paradigms network to allow local authorities, public and private, to connect together heterogeneous video surveillance systems, already installed or newly installed, and to share access for a distributed use of resources.

Other significant effects reported by the beneficiaries concerned the strengthening of the knowledge and skills of companies (for example, in the field of nanomaterials and applied sensing with possible future developments on new projects or in the mastery of new KETs), the development of networking and partnerships, with particular regard to collaborations with the world of research and with business networks (see paragraph 5.2 in this regard) and commercial development (e.g. activation of new commercial contacts).

As can be seen, even if the impacts of this action will only be able to be measured correctly in the coming years, within the 2021-27 programming, given that the conclusion of the financed actions has been moved towards the end of the 2014 programming -20 to the so-called n+3 period, in any case the results recorded were certainly very satisfactory, as also underlined by some regional stakeholders. These results have, in fact, certainly contributed to the achievement of the transversal objective of the S3 Sicily 2014 2020 Strategy, i.e. the promotion of the widest diffusion of the culture of innovation at all levels of regional society.

Given the effects achieved, in fact, as many as 81.5% of the beneficiaries believed that similar interventions should be proposed again in the future, considering the relevant and significant contribution they can provide to promote the technological advancement of businesses.

The other stakeholders interviewed also reiterated the positive strengthening effects of research into technological development and innovation, although some highlighted that it is premature to talk about lasting impacts. In particular, the Rector's delegate to the third mission of the University of Messina underlined that although there has been a great effort in this direction of creating innovation results that can then be used by companies, the absorption by companies of the technological development and innovation is a phase two which is called valorisation of research. In essence, innovation will have to be made sustainable over time from an

economic-financial and management point of view, overcoming the rigidity of the rules of engagement and fund management and ensuring the marketing of innovations.

In the opinion of the project manager of the NAVTEC District, Research Consortium for technological innovation, Sicily Naval, Commercial and Pleasure Transport, measure 1.1.5 was fundamental in some contexts to give financial support to research and innovation paths that follow multi-year trajectories already undertaken by some large companies (e.g. Fincantieri, Caronte&Tourist), while in other cases it has contributed to starting a path of innovation (e.g. “No Fire” project by Colorificio ATRIA), favoring in all cases processes of technological or research contamination. For this reason, the union and collaboration between university and industry has been fruitful, although not without critical issues, given the different needs, speeds and times of research and industry, which are not always easy to reconcile, but which in any case it worked, proving crucial to develop a series of necessary skills and also to innovate industrial products and processes within the maritime economy of the S3 strategy.

Moving on to examine the effects of Action 1.1.2, we must first of all underline the effects of development and commercial improvement of the companies involved, as well as the improvement of the technical-organisational capacity and business organisation, obtained thanks to the implementation of the projects financed by the ERDF OP Sicily 2014 – 2020 as part of this action and in particular the support provided to companies through the catalog offer of advanced, knowledge-intensive services.

These effects were confirmed by 79.8% of the beneficiaries¹², according to which the projects financed by the OP ERDF Sicily 2014 – 2020 contributed significantly (39.5%) and in any case decisive (40.3%) to the technological innovation of companies (see Tab. 15). The contribution to strategic and organizational innovation was also important (large for 26.1% but still significant for 47.1%) and, although to a slightly lesser extent, to the commercial innovation of companies (respectively large for 26.1% and significant for 35.3%).

Tab. 15 - Contribution of the qualified services received to the technological, strategic, organizational and commercial innovation of the company, according to the beneficiaries – Action 1.1.2

	<i>Technological innovation</i>		<i>Organizational innovation</i>		<i>Commercial innovation</i>	
	IT GOES	%	IT GOES	%	IT GOES	%
1 – No contribution	5	4.2	7	5.9	9	7.6
2 -	3	2.5	4	3.4	8	6.7
3 –	16	13.4	21	17.6	29	24.4
4 –	48	40.3	56	47.1	42	35.3
5 – Great contribution	47	39.5	31	26.1	31	26.1
Total	119	100.0	119	100.00	119	100.0

Source: IZI, Survey of OP ERDF beneficiaries 2014-2020, July-September 2023

As regards Action 1.1.2, the main effects achieved are reported, ordered by rank based on the number of reports from beneficiaries:

- a) **business development and commercial improvement**involved, including improving company visibility and reaching customers and developing in terms of turnover (26 reports);
- b) improvement of technical-organizational capacity and company organization (21 reports);
- c) **technological innovation** (9 occurrences);
- d) **strengthening knowledge and skills** (7 occurrences);
- e) **strengthening of networking** (4 occasions);
- f) energy efficiency (3 reports);

¹² See the Appendix – Analysis methodology. In the case of Action 1.1.2, the 119 companies that responded to the survey correspond to 59.5% of the financed projects (200).

g) product improvement (2 reports).

The above list can be considered a cognitive representation of the effects considered most important by the beneficiaries. The following box shows the most significant examples.

Examples of improvement and innovation effects due to business services reported by beneficiaries

Commercial development and improvement

Creation of new development opportunities

Opening of new markets

Increase in turnover

Strengthening commercial capacity

Business improvement

Improvement in business processes

Improvement of the company's commercial potential, thanks to new tools and innovative marketing

Strengthening of commercial tools

Strengthening of commercial activities and presence on the network

Improvement/strengthening of the company brand through innovative marketing actions

Greater visibility of the company and consequent possibility of reaching a greater number of potential customers

Through the support of the new dissemination systems offered by e-marketing and business intelligence, it was possible to determine a commercial improvement of the company

Improved operational, marketing and governance strategies

Improvement of the e-commerce portal for B2B and B2C sales services

Improvement of technical-organisational capacity and company organisation

Increase in organizational and production capacity

Improvement of the company's technical and organizational capacity

Improvement of the company's organizational management

Improvement in organizational processes

Better management of the organization of workflows

Better work organization

Optimization of both structural and organizational processes

Adaptation of process mapping and introduction of "mobile" solutions for managing personnel and equipment

Increase in the performance of company agents and the organization of internal work, thanks to the activation of an e-commerce platform and its synchronization with the company management system

Optimization of company information systems

Significant improvement of business processes

Synergy between the various departments and points of sale

Redesign of an effective and efficient strategic management of the supply chain, i.e. Supply Chain Management (SCM), which is divided between the activities of producers, intermediation services, distributors and logistics operators, and brings them together within an innovative BPM matrix technological platform

Technological innovation

Acquisition of new technologies for the creation of innovative services for the efficiency of the Integrated Water Service

Development of service-oriented mobile applications to be offered to the end users of the food truck

Digital innovation (e.g. improvement of the web system, digital and management systems, Business automation, Smart Business, Dashboard)

App Development

Development of customized devices for interbody function with innovative technology

Development of an innovative system capable of allowing the patient user to book, pay and subsequently receive online the reports of all clinical and diagnostic imaging tests carried out

Strengthening knowledge and skills

Increase in the company's technological know-how

Acquisition of greater awareness of company energy inefficiencies

Raising corporate technological skills

Greater short- and medium-term planning ability

Networking

Strengthening of the professional studio in the network

Greater presence on the network

Strengthening the company's presence on the network

Energy efficiency

MIWT was able to optimize energy consumption through monitoring energy carriers and installing specific instrumentation. Significant energy savings for the company through the definition of an ad hoc energy efficiency path resulting from the production peculiarities of the plant

Product improvement

Improvement of the eco-profile of the company fixtures product aimed at compliance with the minimum environmental criteria for construction pursuant to Ministerial Decree 11/10/2017

Obtaining high quality products

***Exemplary cases of improvement and innovation due to business services
reported by beneficiaries and stakeholders***

The Yes School project (Smart Cities & Communities area), carried out by the Darwin Technologies Consultant, thanks to the creation of innovative services such as e-marketing and community building tools with the implementation of an integrated platform aimed at the world of teaching services that served as e-Marketing and a virtual community building system, it produced a radical change in terms of the digital transformation of the company's marketing processes. The project has in fact brought as a concrete result the creation of digital tools that make the digital transformation of the company possible in relation to its marketing processes. This had the immediate impact of increasing the company's competitive advantage, thanks to the availability of appropriate digital marketing tools that will allow the implementation of its digital strategy. The results obtained thanks to the implementation of the project have allowed the company to fully fit into a context strongly characterized by the massive use of online tools and to reach an increasingly segmented, informed audience with little time available.

The Ecological Packaging project (Energy area) has made it possible to obtain energy efficiency results, through interventions such as the production of electricity from renewable sources, directly on site through the installation of a 200 kWp photovoltaic system, or the replacement of heating resistors allocated around the cylinder of electric presses, so as to increase productivity and the quality of the final product by reducing cycle times and changing process variables.

The service offered by the consultant Net Service srl to ABC Medical srl (Life Sciences sector) guaranteed the introduction of process and organizational innovations, carrying out in-depth engineering of the primary and management processes through an IT intervention to support the management and traceability of users' PDTAs (Diagnostic, Therapeutic and Assistance Paths) consistently with the planned treatment plan. Thanks to this intervention, the image of ABC Medical srl is improved following the definitive introduction into the market of innovative health models that are participated and shared with the end user and with all the stakeholders in the healthcare world.

Based on the impacts achieved, the beneficiaries reiterated that supports such as those envisaged by Action 1.1.2 of the OP ERDF 2014-2020 can provide a significant contribution, in order, to technological innovation (63%), to organizational innovation (50.4%) and commercial innovation (48.7%) of Sicilian companies.

Tab. 16 - Extent to which supports such as those provided for by action 1.1.2 of the ERDF can contribute to the technological, strategic, organizational and commercial innovation of Sicilian companies, according to the beneficiaries

	<i>Technological innovation</i>		<i>Organizational innovation</i>		<i>Commercial innovation</i>	
	IT GOES	%	IT GOES	%	IT GOES	%
1 – No contribution	0	0.0	0	0.0	2	1.7
2 -	0	0.0	3	2.5	7	5.9
3 –	14	11.8	20	16.8	22	18.5
4 –	30	25.2	36	30.3	30	25.2
5 – Great contribution	75	63.0	60	50.4	58	48.7
Total	119	100.0	119	100.00	119	100.0

Source: IZI, Survey of OP ERDF beneficiaries 2014-2020, July-September 2023

Finally, as regards Action 1.1.3, the evaluation made it possible to record as main effects the identification and adoption of innovative solutions in the processes, which led to the industrialization of the research results, as well as significant innovation effects of products, while the contribution to innovation in organizational formulas was more limited.

This was confirmed by 60% of beneficiaries¹³ who argued that the projects carried out contributed significantly to identifying innovative solutions in the processes, which led to the industrialization of the research results. Furthermore, 70% of beneficiaries believed that there was a significant contribution to product innovation, while only 30% claimed that the contribution was relevant to innovation in organizational formulas.

Tab. 17 - Extent to which the projects contributed to identifying innovative solutions in processes, products and organizational formulas and led to the industrialization of research results, according to the beneficiaries

	<i>Process innovation</i>		<i>Innovation in products</i>		<i>Organizational innovation</i>	
	IT GOES	%	IT GOES	%	IT GOES	%
1 – No contribution	0	0.0	0	0.0	2	20.0
2 -	1	10.0	0	0.0	0	0.0
3 –	2	20.0	0	0.0	5	50.0
4 –	1	10.0	7	70.0	1	10.0
5 – Great contribution	6	60.0	3	30.0	2	20.0
Total	10	100.0	10	100.00	10	100.0

Source: IZI, Survey of OP ERDF beneficiaries 2014-2020, July-September 2023

¹³ See the Appendix – Analysis methodology. The 10 companies that responded to the survey constitute 76.9% of the projects financed by Action 1.1.3 (13).

**Exemplary case of innovative solutions in processes, products and organizational formulas
reported by beneficiaries and stakeholders**

The CareMED project (Life Sciences sector) has developed a Web Based healthcare ERP (Enterprise Resource Planning), i.e. software that helps organizations automate and manage business processes to achieve optimal performance. Thanks to the very important contribution given by the medical staff to the project, it was possible to create a software that is easy to read even for "non-experts", through the use of a representative language that allows everyone to understand in a simple and intuitive way the data, thus creating a widespread system of analysis. In particular, the software allows the constant monitoring of the economic, financial and organizational trends of companies even without a physical presence on site, rather than creating a Web Based structure for actions that must necessarily be carried out by healthcare professionals.

Based on these considerations, the beneficiaries then recognized how measures such as those implemented can, in fact, provide a great contribution to the identification of innovative solutions, in terms of processes (70%), products (50%) and in organizational formulas and the industrialization of research results (30%).

Tab. 18 - Extent to which supports such as those envisaged by action 1.1.3 of the ERDF can contribute to the identification of innovative solutions in processes, products and organizational formulas and to the industrialization of research results, according to the beneficiaries

	<i>Process innovation</i>		<i>Innovation in products</i>		<i>Organizational innovation</i>	
	IT GOES	%	IT GOES	%	IT GOES	%
1 – No contribution	0	0.0	0	0.0	0	0.0
2 -	0	0.0	0	0.0	0	0.0
3 –	1	10.0	1	10.0	4	40.0
4 –	2	20.0	4	40.0	3	30.0
5 – Great contribution	7	70.0	5	50.0	3	30.0
Total	10	100.0	10	100.00	10	100.0

Source: IZI, Survey of OP ERDF beneficiaries 2014-2020, July-September 2023

5.2 The evident development and consolidation of networks between companies, universities and research institutions and the confirmation of the fundamental role of partnerships for the success of the S3 strategy

The use of Social Network Analysis, as a useful method for identifying the role of the networks and links between the various social actors involved, often formalized in real strategic partnerships, as well as the contribution provided by the networks and partnerships themselves to the implementation of the ERDF Operational Program Sicily 2014-20 and the implementation of the S3 Strategy, made it possible to identify among the main impacts of Action 1.1.5 the development and consolidation of networks between businesses, universities and research bodies and to confirm the fundamental role played by partnerships for the success of the S3 Strategy. These effects emerge clearly from the results of the survey with the beneficiaries, from the consultation of stakeholders and from the subsequent in-depth analysis of some exemplary cases of completed projects.

It is worth highlighting here, in support of the analysis carried out on the OP, that the 2019 Istat survey highlighted how the increase in collaborations with other companies was judged by 24.7% of Sicilian companies as a strategic objective (the national figure was 27.5%). Nonetheless, Sicily seemed to present a greater aptitude for the formation of networks (formal and informal): 16.0% compared to 14.3% at the national level, with a fundamental role of the more structured companies, more inclined to associate with other bodies, probably because they are less insecure with respect to the ability to manage the same agreement in an advantageous

way. However, scientific research and technological development (R&ST) do not figure as the driving force of these agreements: more decisive factors are, instead, the development of new products and access to new technologies.

5.2.1. Stability of partnership networks to support innovation trajectories

Since its formulation, the Notice of Action 1.1.5 has intended to pursue the objective of financing projects carried out in partnership between companies and research bodies and structures. Consequently, the presence of a research institution was established as a requirement for the establishment of the partnership, and therefore concerned all funded projects.

According to the findings, in large part these are partnerships between pre-existing companies and research institutions, which in some cases have involved other partners. These partnerships included other companies in addition to the leader, in 87% of cases. As noted by some stakeholders, these partnerships have been functional to the development of innovation paths identifiable as trajectories that go beyond individual financial instruments, and given the complexity of the issues, referring to community funds, they also extend across different programming. Furthermore, the element of continuity of relationships between partners was seen by the interviewees as an element of sustainability and strengthening of innovation.

Stakeholder testimonials (1)

In the context of the maritime economy, as regards large players such as Fincantieri, Intermarine, Caronte & Tourist (members of the NAVTEC district), these are innovation paths already started in the past in other contexts, with other technologies and therefore generally various actors already knew each other.

The consortia are quite stable, i.e. the ATS that were formed had already been activated with different compositions. Maybe in another project there was Liberty Lines instead of Caronte & Tourist, but the collaborations tend to be between the University of Messina and the companies.

In the case of the No fire-nave project, however, Colorificio Atria had already had consultancy and in any case carried out research activities with the University of Palermo. The University of Messina and the NAVTEC district got to know Colorificio Atria during this project, developing the part that interested them, that is, expanding their products in the naval field.

In general, these are paths that did not begin with this announcement, and which will not end with it, but are part of an evolution, a trajectory. The call was functional to carry out activities which, however, were already in some way within a general research and development trajectory, in which other subjects who bring new knowledge are inserted.

Stakeholder testimonials (2)

As reported by the operational director of the Mediterranean Oncology Institute (member of the Biotec District), in the Life Sciences specialization area, most of the partnerships are established with historical relationships that are now consolidated and continue to function. In Sicily, companies always have excellent relationships with the university departments of all three universities and more recently with the University of Enna. We have always continued these relationships within the world of innovation and therefore also in the ERDF.

The historical partners are the research and academic partners, both the universities and the National Institute of Nuclear Physics, i.e. those who do the basic research. With respect to the company, those with whom we have undertaken a new relationship are the industrial partners. The DIOncogen project was born from a clinical idea of the Oncology Institute which worked alongside some industrial partners who then carried out the technical part: digitalisation is not within the scope of the Mediterranean Oncology Institute, the same goes for the application of the artificial intelligence. We need a technical partner who does exactly that thing and so it was born and will continue. Given the results, we hypothesize a second step in the 2021-2027 programming, with the same partnership or in any case with a large part of it.

In addition to the partnership members, it is important to note that approximately a third of the partnerships (31.5%) had the opportunity to come into contact with other partnership networks. Also in this case, the survey respondents stated that they came into contact with already existing networks of companies (76.5%), already existing networks of research institutions (94.1%) and already existing networks made up of companies and institutions of research (82.3%).

Stakeholder testimonials (3)

How is contact with other networks made? In the context of the maritime economy, a series of Open Innovation days were promoted during the programming which allowed the exchange of information and the comparison of the different innovation trajectories.

During these meetings, each partnership was able to obtain information on what the others are doing and this brought out ideas that can become new projects in the 2021-2027 programming, recombining the activities carried out and the results achieved to promote further evolution, both in terms of technology and field of application.

Regarding the specific characteristics of the partnerships, essential to ensure continuity, sustainability and the strengthening of innovation, the evaluation carried out allowed us to identify some essential peculiarities that these partnerships characterized by stability have in common.

The first characteristic concerns the presence of the technical and scientific skills necessary for the implementation of industrial research and experimental development projects. This requirement, although obvious, is a fundamental requirement for the success of the projects and, in general, to ensure project quality on the basis of the principles of project cycle management, in application of which the projects are organized into work packages entrusted to specific components of the partnership on the basis, precisely, of competence.

The second characteristic concerns the management capabilities of the individual partners, with particular reference to the organisational, administrative and activity monitoring capabilities. It must be said that it is more difficult to find the widespread presence of these capabilities in small entities with a limited number of resources. For example, in micro-enterprises one can often find an overlap of the roles of project implementation, monitoring and administrative reporting in the same resource, with poor results especially from the point of view of monitoring, reporting and relations with the leader and the of the partnership as a whole, which are seen as ancillary to the implementation of the activities.

Another relevant characteristic concerns the coordination and leadership ability of the leader, especially in cases where he can deploy resources with leadership and high scientific and management skills. This leadership characteristic can also be associated with the creation of a climate favorable to the development of relationships and effective cooperation within the partnership.

5.2.2. Broad involvement of business entities

In the case of Action 1.1.5, the most relevant of OS 1.1 (87.8% of the resources financed under the OS), a more in-depth analysis was carried out for a better understanding of the partnership relationships activated through the financing of the operations.

Overall, as many partnerships made up of 389 subjects were involved in the implementation of the 69 projects: 69 lead companies, a further 180 companies forming part of the partnerships and 140 research bodies.

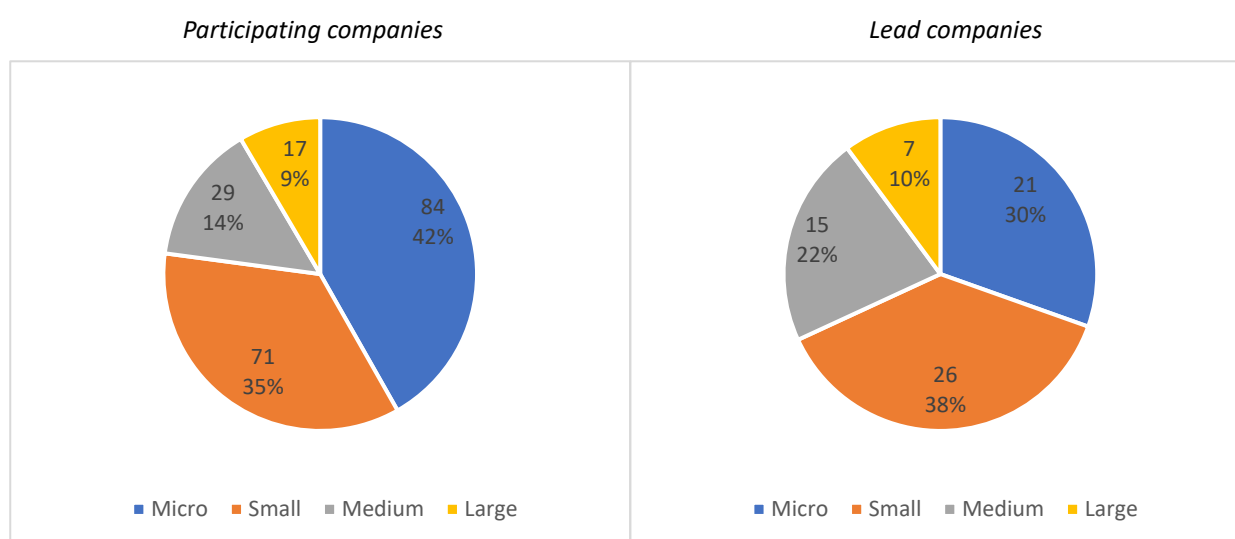
As explicitly indicated by the Notice and subsequently clarified in the FAQ, it was envisaged that a beneficiary could present himself as the leader of only one project, but participate in others as a partner without limitations.

In fact, as will be seen, some subjects participated in multiple projects. If we refer to the individual participating subjects, there are 245 unique entities: 201 companies and 44 research organizations¹⁴.

In any case, one cannot fail to underline as a clear result of Action 1.1.5 of the OP ERDF 2014-20, the increased involvement of businesses in regional initiatives to support innovation and the related development of partnerships of the same businesses with centers of research and universities, as desired by the OP.

In the next figure, you can see the distribution of the 201 companies participating in one or more projects, according to size. It is interesting to observe that in 42% of cases it is a micro enterprise, in 35.5% of cases it is a small enterprise, in 14.5% of cases it is a medium enterprise and in 8.5% of cases it is a large enterprise. The widespread participation of micro and small businesses in the implementation of Action 1.1.5 is supported by the data relating only to the leaders of the projects. In this case, there is a prevalence of small businesses (37.7%) and micro businesses (30.4%), while medium and large businesses are 21.7% and 10.1% respectively.

Fig. 20 - Distribution of companies participating in Action 1.1.5 and lead companies according to size.



Source: calculations based on data from the DDGs granting the contribution (Action 1.1.5), www.euroinfoscilia.it.

The comparison between the two figures allows us to make some observations. As can be seen, the percentage of micro-enterprises present in all the partnerships is equal to 41.8%, while they are the leaders of 30.4% of the projects. The role of leader is carried out mainly by small companies (37.7% of the lead companies and 35.5% of the participating entities) and to a lesser extent by medium-sized companies (which are 21.7% of the lead companies and 14.4% of the companies involved in the Action) and by large companies (10.1% and 8.5%, respectively).

The decrease in the share of micro-enterprises as project leaders compared to the total is probably influenced by the latter's lower capacity, even before project management, in building the partnership and in technical design according to the required European standards.

However, it is important to underline that they - which it is worth remembering constitute the most numerous type of Sicilian companies - are the leaders of over 30% of the projects, also in consideration of the fact that in most cases they involve projects of significant economic dimension (only 3 projects have a budget of less than one million Euros, 20 in the range 1-1.9 million Euros, 19 between 2 and 2.9 million Euros and 27 over 3 million Euros).

However, it should be noted that the average amount of projects varies quite consistently with the size of the lead companies (see the following table). The projects whose leader is a micro-enterprise are in fact significantly lower in amount than the others, with average differences of 0.2 million euros from the projects whose leader

¹⁴ The various institutes (e.g. of the CNR) and university departments, where indicated, were considered as distinct bodies.

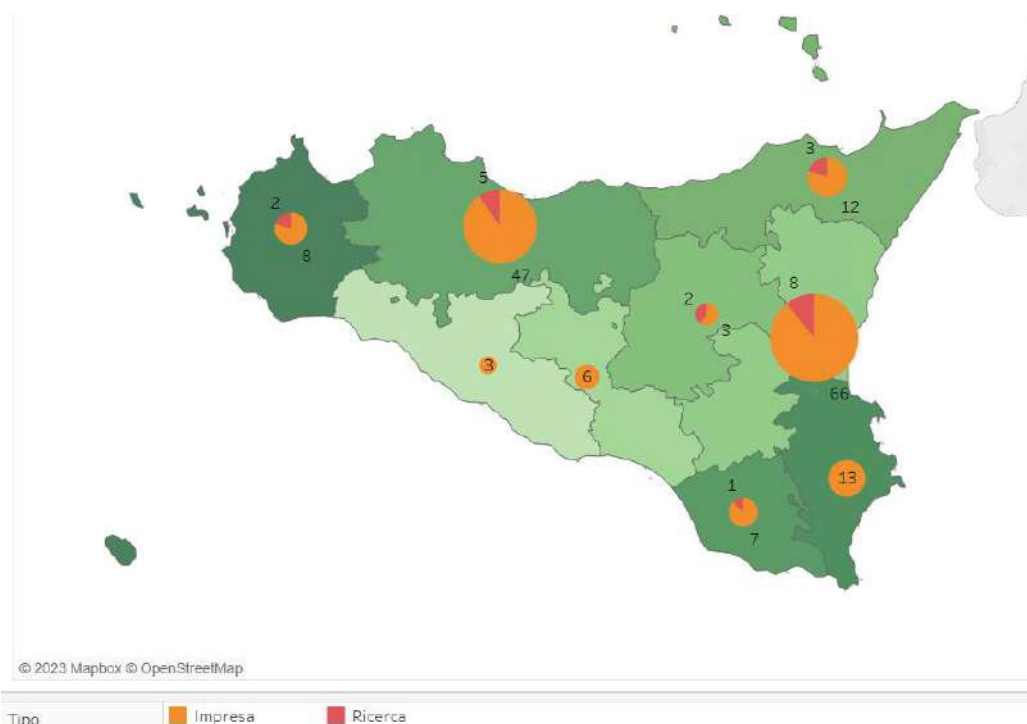
is a medium-sized enterprise, of 0.5 million euros compared to those which have a small company as their leader and 0.7 million Euros compared to those whose leader is a large company.

Tab. 19 – Average amounts financed according to the size of the companies leading the projects of Action 1.1.5

Lead company	Average project amount	Number of projects
Great	3,083,272.81	7
Average	2,562,414.61	15
Micro	2,349,936.82	21
Small	2,819,497.11	26
Total	2,647,459.81	69

Source: calculations based on data from the DDGs granting the contribution (Action 1.1.5), www.euroinfosicilia.it.

Fig.21 - Unique subjects by Sicilian province and type of subject



Source: calculations based on data from the DDGs granting the contribution (Action 1.1.5), www.euroinfosicilia.it.

As regards the headquarters of the entities that participated in Action 1.1.5, reference can be made to the previous figure, which shows a greater concentration in the provinces of Catania (74 entities) and Palermo (52). In fact, 68.1% of all the entities present in Sicily and 51.6% of all the entities involved are based in the two provinces.

In this regard, it is also necessary to remember that the Notice required that the participating entities have headquarters or at least one local production unit receiving the intervention in the regional territory, a requirement to be satisfied at the time of the first payment of the aid granted as an advance, payment intermediate or balance (Notice 1.1.5, point 2.2.f).

The other subjects are found mainly in the provinces of Roma (22, mainly due to the presence of the CNR) and Milano (11). A research institute is located in Romania (Dunarea de Jos University of Galati).

It should also be noted that 195 entities were involved in only one project, while the remaining 49 were part of more than one partnership. The entities that have been part of the most partnerships are the universities of Palermo (30), Catania (28), Messina (12). This highlights the central role of Sicilian universities in the innovation process.

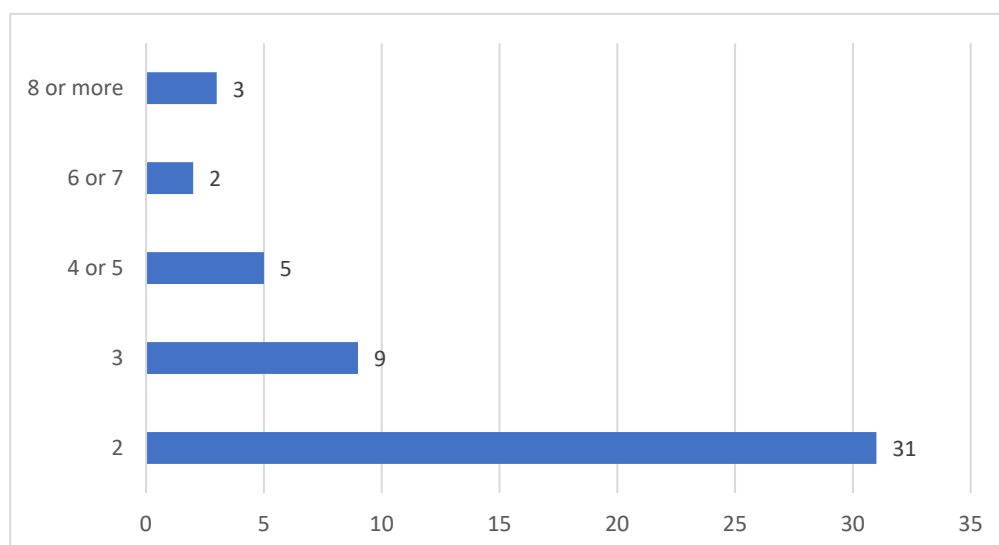
Other particularly active subjects were the following:

- IRCCS Bonino Pulejo Neurolesi Center of Messina (7);
- National Research Council (6)
- CERID - Research center for innovation and dissemination of knowledge - Soc. coop. Soc. of Catania (5);
- CERTY CEQ srl of Catania (5);
- Arancia-ICT Srl of Palermo (4);
- SCS AREA S.COOP. of Catania (4);
- Free University of Enna "Kore" of Enna (4);
- National Research Council - "Nicola Giordano" Institute of Advanced Energy Technologies (3);
- Research consortium for technological innovation, Sicilia Trasporti Navali, Commercial and Diporto sc a rl of Messina (3),
- Enter Med srl of Palermo (3);
- Etna Hitech scpa of Catania (3);
- Ri.MED Foundation of Palermo (3);
- Medilink, SRL of Floridia (3);
- Red Raion, SRL of Acireale (3);
- Software Engineering Italia srl of Catania (3).

The list of subjects who have been particularly active in participating in various partnerships confirms the important role played by research centres, beyond the Sicilian universities, demonstrating the significant strength represented by the presence of numerous research institutes in the regional territory, some of which are national or of national importance. In the first places in terms of participation in partnerships there are, in fact, research institutes such as the National Research Council (6) and CERID - Research Center for innovation and diffusion of knowledge - Soc. coop. Soc. of Catania (5), as well as the IRCCS Centro Neurolesi Bonino Pulejo of Messina (an important scientific hospital and treatment institute that carries out research in the fields of neurorehabilitation, neurophysiology, neuroimmunology, experimental neurology and molecular biology), which participated in 7 partnerships.

The most active entrepreneurial entities were CERTY CEQ srl of Catania, which participated in 5 Arancia-ICT Srl partnerships of Palermo (4) and AREA SCS S.COOP. of Catania (4). In all three cases these are companies that have a significant connection with innovation. In particular, CERTY CEQ srl is a certification body, Arancia-ICT Srl offers services, consultancy and IT solutions, AREA SCS S.COOP operates in the field of experimental research and development in the field of social sciences and humanities.

Fig. 22 - Subjects who have been part of more than one partnership, according to the number of partnerships in which they participated



Source: calculations based on data from the DDGs granting the contribution (Action 1.1.5), www.euroinfosicilia.it.

5.2.3. Relations between companies and research centres

We recalled above the central role of universities, in particular the Sicilian ones, and more generally of research centers, for the implementation of innovation activities. This, as mentioned, was certainly true in the context of Action 1.1.5 from a quantitative point of view, due to the criterion of building partnerships.

The evaluation survey, mainly through interviews with stakeholders, made it possible to shed light on further significant aspects of the relationships between companies and research centres.

First of all, a custom of business relationships with the university departments of all three universities of Palermo, Catania and Messina, and more recently with that of Enna, has emerged.

This custom is linked to a continuity of relationships established between companies and Sicilian universities, but also with other research centres, which goes beyond participation in the individual partnership. In fact, as has already been highlighted, the continuity of relationships has led to the construction of stable partnerships for carrying out research and innovation paths. These partnerships are therefore in many cases pre-existing to those built for the implementation of projects financed by the ERDF Sicily and exploit the various existing financial opportunities given by the various European and national funds to pursue their objectives and give continuity to research and innovation paths.

On the other hand, continuity of relationships can also develop starting from the construction of a specific partnership with the birth of a new stable relationship. This is the previously mentioned case of a project financed under OS 1 which allowed companies to establish relationships with universities (and more generally with research centres) and these relationships then tended to become autonomous from the project and to enter the business relations system. This is particularly true for companies that did not have relationships with research centers and universities.

In essence, these collaborations have actually led to dynamics of exchange and contamination. As reported by an interviewee with solid experience in the world of industry, on the one hand, the relationship with research bodies has forced companies to move away from an efficiency-driven logic regarding, for example, product creation times, widening the spectrum of action and opening up new fields of research and product development in directions that were not thought possible.

On the other hand, there has been a transfer of entrepreneurial culture within some university departments. This, as has been underlined, worked because the collaboration between the researcher with an industrial approach and the researcher and the teacher with an academic approach found a convergence towards a single objective of realizing the final result, although the interests were partly different.

Stakeholder testimonials (4)

Industrial doctorate: a bridge between academia and business

In the field of specialization of life sciences, we have worked hard to build a different culture within the academic world, also through the training of figures with the know-how that comes from academia and the industrial mentality that comes from business. With these departments with which the collaboration works we annually manage several industrial doctorates, which are these courses that train figures with the skills of the academy but who provide their research activity within the Oncology Institute and therefore begin to have a culture different from the single academic purpose.

Another notable element concerns the extension of relations with research centres, and mainly with universities, to all companies in the partnership.

Even with significant exceptions, i.e. projects in which the construction of preferential relationships between research centers and some specific companies in the partnership was evident, in many cases there was a synergistic connection that involved the entire partnership, thus offering the possibility to all companies to build relationships with research institutes, which could give rise to new ideas and research and development programs in the future.

5.2.4. Composition of the partnerships

The partnerships have on average 5-6 participating subjects, with a modest variation depending on the areas of the S3 Strategy, as shown in the following table.

Tab.20 – Average number of project partners, by area

	<i>Number of entities</i>	<i>Projects</i>	<i>Media partners</i>
Agri-food	57	11	5.2
Blue Economy	24	5	4.8
Energy	61	10	6.1
Life science	155	26	6.0
Smart Cities & Communities	51	10	5.1
Tourism Cultural heritage Culture	41	7	5.9
Total	389	69	5,6

Source: calculations based on data from the DDGs granting the contribution (Action 1.1.5), www.euroinfosicilia.it.

Another considerable element of attention concerns the composition of the partnerships from the point of view of the territorial location of the partners. In this regard, the partnerships have been classified as regional in cases in which all partners are based in Sicily and as extra-regional in cases in which at least one partner has its registered office outside Sicily. As can be seen in the following table, 48 projects (69.8%) were carried out by an extra-regional partnership, a circumstance which shows the existence of a network connecting the companies involved which is not limited to the regional reality.

Tab. 21 – Number of partnerships, by scope of the S3 Strategy and type

	<i>Extra regional</i>	<i>Regional</i>	<i>Total</i>	<i>Extra regional leader</i>
Agri-food	6	5	11	2
Blue Economy	3	2	5	1
Energy	9	1	10	1
Life Sciences	18	8	26	6
Smart Cities & Communities	7	3	10	2
Tourism Cultural Heritage Culture	5	2	7	3
Total	48	21	69	15

Source: calculations based on data from the DDGs granting the contribution (Action 1.1.5), www.euroinfosicilia.it.

It should be remembered that beneficiaries without a registered or operational headquarters in Sicily, according to the Notice, had the obligation to have an operational headquarters in Sicily starting from the first payment or advance.

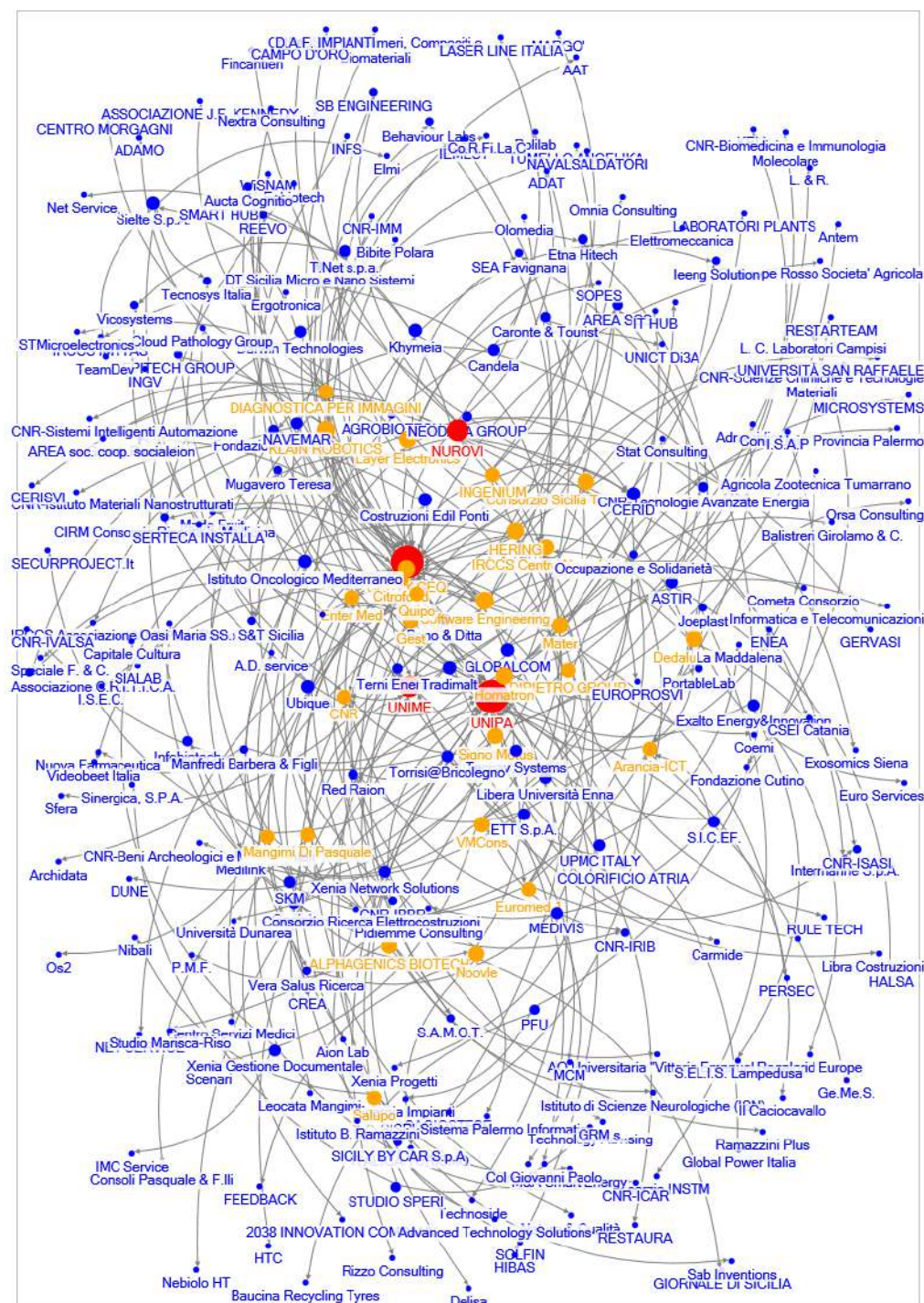
Even if it is difficult to establish the precise reasons that led the proponents to form a partnership including extra-regional subjects, the examination of the sectors in which there is the greatest presence of partnerships of this type can suggest some explanatory indications.

With regards to the Energy sector, where 90% of the projects are made up of extra-regional partnerships, the extra-regional partners are largely represented by research bodies (CNR, National Inter-university Consortium for the Science and Technology of Materials - INSTM, National Agency for new technologies, energy and sustainable economic development - ENEA), while the companies are represented by large companies (STMicroelectronics SRL, Terni Energia spa, Col Giovanni Paolo spa), two small companies (ADAT srl, Energia Impianti srl) and one micro enterprise (Regalgrid Europe srl).

The projects with extra-regional partnership in the Tourism and cultural heritage sector include, in addition to the CNR as a research body, micro to medium-sized companies and, similarly, as regards the Smart Cities &

Fig. 23 – Connections between Action participants 1.1.5

Social media network connections



Created with NodeXL Basic (<http://nodexl.codeplex.com>) from the Social Media Research Foundation (<http://www.smrfoundation.org>)

Source: calculations based on data from the DDGs granting the contribution (Action 1.1.5), www.euroinfosicilia.it.

Another element that can be deduced from the evaluation, and which has been highlighted in the table, concerns the presence of leaders (15 out of 69 projects - 21.7%) who were evidently located in the Sicily region thanks to the intervention of the OP ERDF 2014-20 or who in any case have consolidated their presence through the Program. The following graph shows the relationships between the entities that implemented the Action 1.1.5 projects, where the arcs indicate the relationships between the lead companies and each of the partners. In particular, we note in red the universities of Palermo, Catania and Messina which were involved in the greatest number of partnerships, as well as the NUROVI company, leader of a partnership made up of 13 other entities.

Fig. 24 - Bodies involved in the partnerships by province



Source: calculations based on data from the DDGs granting the contribution (Action 1.1.5), www.euroinfoscilia.it.

As can be seen, the relationships between entities from different locations take place along some main lines.

Fig. 25 – Main directions of the partnerships

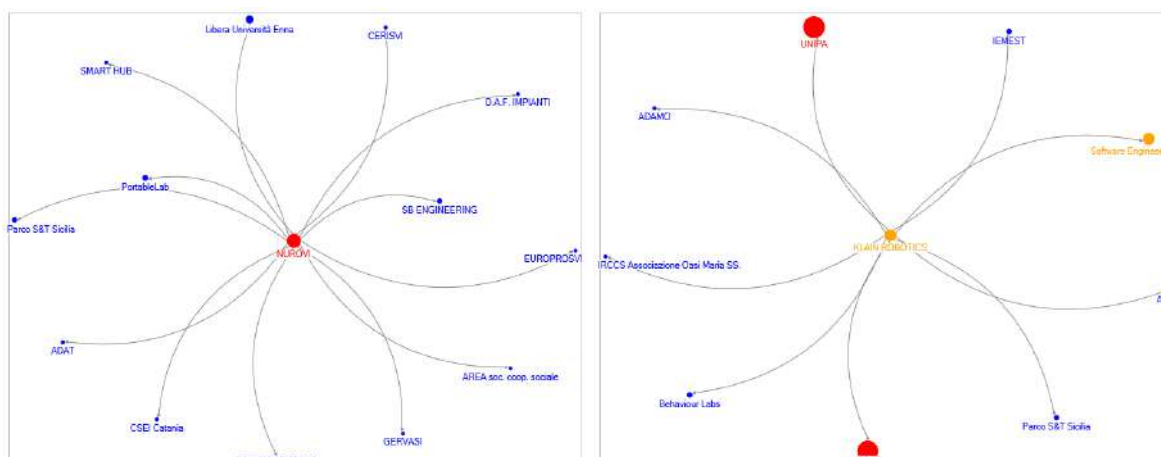
Source: calculations based on data from the DDGs granting the contribution (Action 1.1.5), www.euroinfosicilia.it.

Tab. 22 – Number of partnerships, by main lines

<i>Director</i>	<i>Number</i>
Catania-Milano	9
Catania-Messina	7
Palermo-Milano	7
San Giovanni la Punta-Catania	9
Catania-Roma	5
Catania-Palermo	5
Catania-Brescia	5
Palermo-Molfetta	5

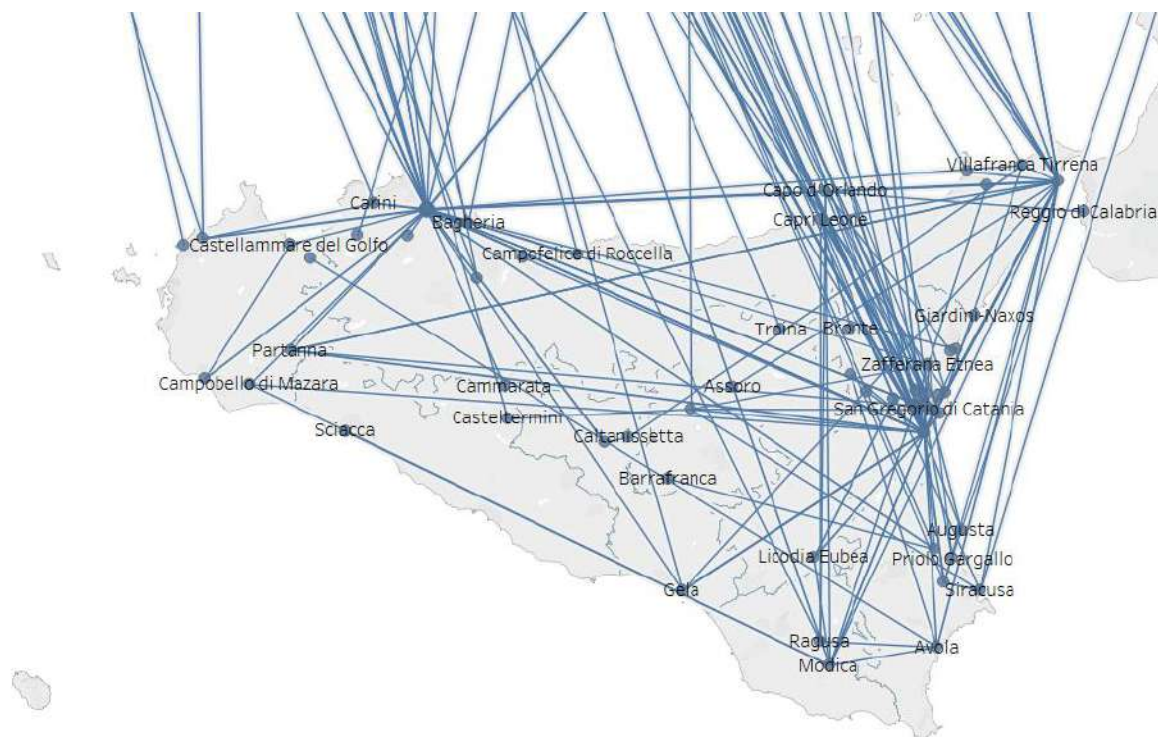
Source: calculations based on data from the DDGs granting the contribution (Action 1.1.5), www.euroinfosicilia.it.

By way of example, two examples of the most numerous partnerships are reported below.

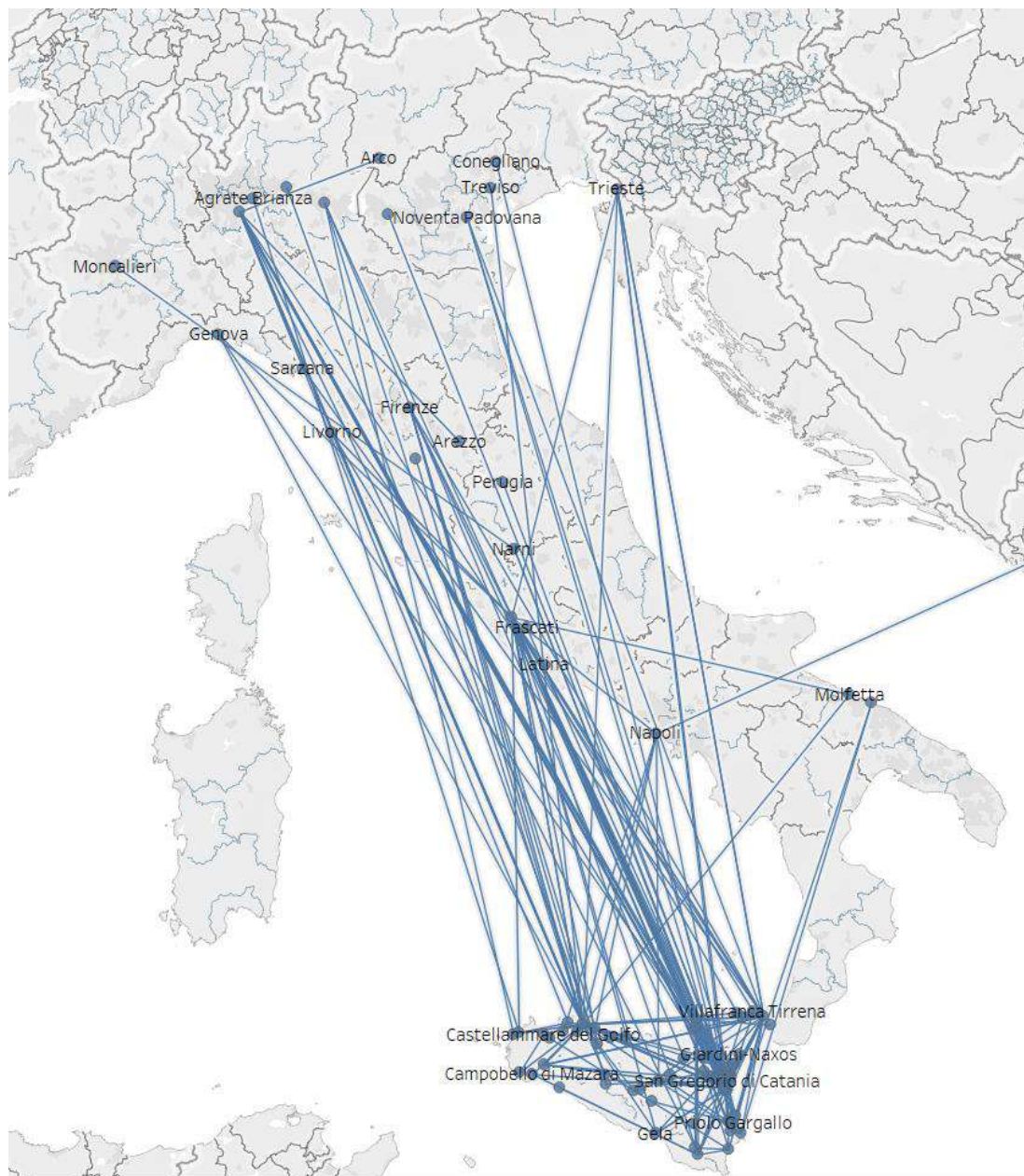
Figure 26 – Examples of the most numerous partnerships:*ProjectDomotic nZeb Building System**3DLAB project - Sicily*

Source: calculations based on data from the DDGs granting the contribution (Action 1.1.5), www.euroinfosicilia.it.

Likewise, it is possible to appreciate the complexity of territorial relations, both at the regional and Italian level.

Fig. 27 – Territorial relations participating in Action 1.1.5 - Sicily

Source: calculations based on data from the DDGs granting the contribution (Action 1.1.5), www.euroinfosicilia.it.

Fig. 28 – Territorial relations participating in Action 1.1.5 – Complete map

Source: calculations based on data from the DDGs granting the contribution (Action 1.1.5), www.euroinfosicilia.it.

A further consideration concerns the strengthening of the regional innovation fabric. In this regard, it was reported by stakeholders that the partnerships created for instrumental purposes for the implementation of the projects also provided stimuli and input to the partners involved.

Stakeholder testimonials (5)

Dissemination of the innovation context to the partnership

In building the project we started from a clinical need for innovation. The Oncology Institute has research laboratories that we used, but there are parts that had to be outsourced through the activities of other partners and therefore the choice of these partners was meticulous precisely because the partners really had to contribute a lot of their work and their competence.

This also gave the partners the opportunity to grow from the point of view of market needs and the final output, but let's say that the partnership of the partners for the final result was fundamental.

However, the relationship should be stimulated, also through specific meeting events for the various stakeholders, days and workshops to present the various projects, because this type of initiative can give rise to new relationships.

Another element of great importance is that of the attractiveness of Sicily, largely due to the quantity of funds and percentage of relief on the contribution granted compared to other Italian regions, but also to a good management capacity on the part of the Sicilian Region (despite the limitations reported by many linked to the slowness of the 2014-2020 programming and the Caronte monitoring system).

Stakeholder testimonials (6)

What is starting to happen is that we are starting to be attractive to some non-Sicilian small and medium-sized businesses and therefore they locate themselves here. We see it with the incubator: we had two companies that settled in our incubator because they were involved in these projects (one from Friuli-Venezia Giulia and one from Lombardy) and they decided to come and bring part of their business and of innovation work here in Sicily; obviously they also did this through participation in the ERDF.

Where we are a little lacking is the aspect relating to the permanence of these companies that locate themselves in Sicily to look for a market and to innovate through the ERDF. Clearly the innovation part is facilitated, while the aspect on which, in my opinion, we need to focus is the maintenance of these settlements in Sicily and therefore means getting products that are not yet market products but outputs or outcomes of innovation projects, get them to the market and therefore to the customers who need to buy.

This is something that has not always worked well in Sicily. We have seen several companies that often came here, made an investment and then, once the project was closed, they were unable to reach the market. In my opinion, we need to focus a lot on this, because it is the stabilization of companies that creates the most wealth. That must be the final objective, it cannot be innovation as an end in itself.

A further element that can be highlighted is that of the composition of the partnerships in the projects of the different areas. The following table shows the lead companies and partners, depending on the type.

Tab. 23 - Composition of partnerships, by area

<i>Scope</i>	<i>Leader</i>	<i>Partner</i>		<i>Total</i>
	<i>Business</i>	<i>Business</i>	<i>Research</i>	
Agri-food	11	25	21	57
Blue Economy	5	8	11	24
Energy	10	30	21	61
Life Sciences	26	73	56	155
Smart Cities & Communities	10	22	19	51
Tourism Cultural heritage Culture	7	22	12	41
Total	69	180	140	389

Source: calculations based on data from the DDGs granting the contribution (Action 1.1.5), www.euroinfosicilia.it.

A different balance between businesses and the world of research can be seen in the partnerships of each area. With the exception of the Maritime Economy area, companies are always numerically prevalent in the Agri-food sectors (1.3 companies in the partnership excluding the lead partner, for each research body), Life Sciences (1.4), Smart Cities & Communities (1.5), Energy (1.6), Tourism, Cultural Heritage and Culture (1.8). At the same time, one cannot fail to observe the significant presence of bodies from the world of research, in particular, in partnerships in the fields of Maritime Economy, Smart cities & communities, Agri-food and Life Sciences.

5.2.5. Partnerships: obstacles and success factors

According to the leading companies of the projects, among the factors that positively influenced the implementation of the project activities, there were above all the quality of the partnership (77.8%), and only to a very limited extent networking (understood as the activation of intervention) (11.1%) and membership of consortia and cooperation networks (11.1%).

Regarding the quality of the partnership, it is useful to remember (see par. 5.2.1) that it mainly refers to the presence of the necessary technical and scientific skills, the management skills of the participating subjects and the coordination and leadership skills of the leader, while the size of the partnership constitutes a secondary element compared to the aforementioned characteristics.

The survey also made it possible to collect some critical elements regarding the management of partnerships, such as those relating to the departure of a partner, the need for the leader to plan the work with each individual partner, collaboration with universities and research bodies that have, above all, from the point of view of timing, completely different approaches.

In this regard, indications were also provided regarding the improvement of partnerships. Among these are:

- involving key personnel early in the project to gain support and encourage effective cross-functional collaboration;
- the expansion of the involvement of companies and research bodies on the issues of the use of artificial intelligence in the healthcare sector;
- the evaluation of the correct number of partners, in order to avoid excessive coordination complexity;
- attention to the quality of partnerships and the re-proposal of partnerships that we have demonstrated ability in managing and implementing projects.

Stakeholder testimonials (7)**The number of partners**

This system is a system that works for individual subjects of innovation systems or for small partnerships of up to a maximum of 5-6 subjects and it works because we know that management in partnership with 5-6 subjects is a management that is compatible with skills and times of the various partners and therefore can be managed well according to the final objective.

Stakeholder testimonials (8)**Organization of the Navtec partnership**

At the beginning the project was organized into work packages, each managed by different responsible subjects; therefore, there was always a contact person, generally from the universities, who took care of the various phases of the project.

Alongside the scientific part, it was suggested to the leader to also request an administrative contact person precisely because the administrative burdens of this tender were numerous and sometimes quite confusing, in the sense that we who are used to European projects and national projects, have given a lack of initial preparation for project monitoring, which was somewhat of the critical phase of the first year.

With the experience we had gained with the PONs with others with the European projects, we immediately set up a structure with all the various subjects who participated and where we were not the leader, we asked the leader to do so, in such a way as to have an administrative documentary set in parallel with the scientific activity.

Obviously, this is not a problem-free relationship. Again, according to the testimonies collected, obstacles have also been posed by companies, which are always very focused on operational aspects and efficiency.

Stakeholder testimonials (9)**Obstacles**

What has worked best is where there has been the development of a new product or in any case an industrial research or experimental development activity, which in some way provided additional information: the company for the development of new products in a prototypical way. Up until the prototype part it worked very well. So, in all the activities that were supposed to provide additional knowledge to the company, everything was fluid and there was a lot of collaboration between all the companies in general and the research institutions.

Where we got stuck a bit is where there was the need to make prototypes or boats available in our case for experimental activities. Obviously, we had to deal with operational aspects, such as having the prototype ship available, carrying out the test, etc. and in combination with the operational needs of the company which ultimately had a downtime.

5.3 The sharing of companies in spending on research and development

Another important result concerns the sharing of companies in spending on research and development.

As is known, the Notice of Action 1.1.5 required co-financing by companies, while recognizing the entire costs to research institutions. Out of a total cost of 182,674,727.13 euros of the projects of Action 1.1.5, the request for financing amounted to 148,039,519.04 euros and the co-financing of the companies amounted to 34,635,208.09 (19.0%).

As can be seen in the following table and figure, the percentage of co-financing by companies to the total cost of the project varies slightly depending on the areas, going from a maximum of 25.3% for the Blue Economy area (in which some large players in the sector were involved) up to the minimum of 17.3% for the Tourism - Cultural Heritage - Culture sector. These percentages rise considerably if we refer to the co-financing of companies with

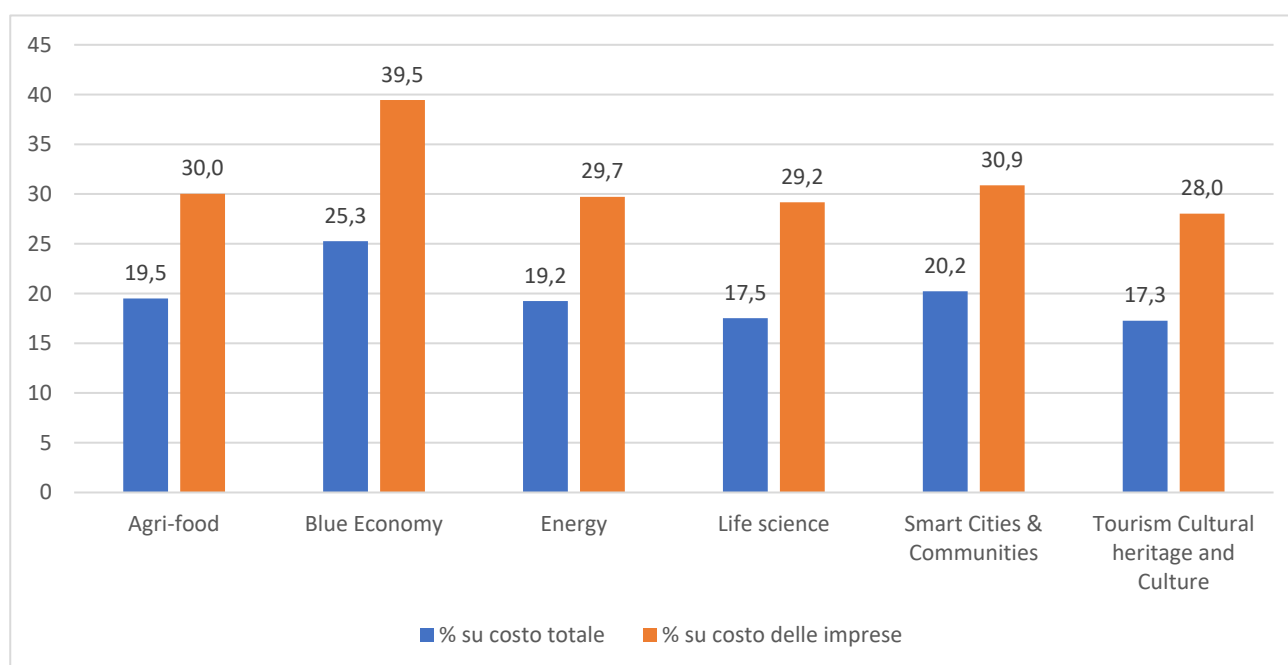
their own costs. In this case, a percentage is obtained that varies from 39.5% for the Blue Economy area to 28.0% for the Tourism – Cultural Heritage – Culture area.

Tab. 24 - Shares of companies in spending on research and development

	<i>Cost of projects</i>	<i>Contributions requested</i>	<i>Co-financing</i>
Agri-food	26,994,463.42	21,730,909.48	5.263,553.94
Blue Economy	13,571,890.39	10.142,781.39	3.429,109.00
Energy	26.456,586.81	21.363,877.99	5.092,708.82
Life science	75,254,587.50	62,073,858.02	13,180,729.48
Smart Cities & Communities	23,509,785.42	18,755,108.54	4,754,676.88
Tourism Cultural heritage Culture	16,887,413.59	13,972,983.62	2.914,429.97
Total	182.674,727.13	148.039,519.04	34.635,208.09

Source: calculations based on data from the DDGs granting the contribution (Action 1.1.5), www.euroinfocilia.it.

Fig. 29 – Percentage of co-financing of companies, according to the areas of Strategy S3



Source: calculations based on data from the DDGs granting the contribution (Action 1.1.5), www.euroinfocilia.it.

A large part of the co-financing (€26,533,774.49, equal to 70.6%) comes from companies based in Sicily. As shown in the following table, the amount of co-financing has a strong territorial characterization, where the 74 companies in the province of Catania provided 38.1% of the total co-financing and the 52 in the province of Palermo provided 26.1%. % of co-financing.

Tab. 25 – Cost, financing requested, co-financing of entities based in Sicily. Research institutions are included

	<i>Cost</i>	<i>Financing</i>	<i>Co-financing</i>	
	EUR	EUR	EUR	% of column
Agrigento	1,006,355.37	615,851.90	390,503.47	1.5
Caltanissetta	3,336,108.00	2,367,897.64	968,210.36	3.6
Catania	55,180,161.10	45,065,881.73	10,114,279.37	38.1
Enna	2,470,438.47	2,029,849.48	440,588.99	1.7
Messina	18,839,775.03	15,751,136.65	3,088,638.38	11.6
Palermo	44,150,852.13	37,212,833.55	6,938,018.58	26.1
Ragusa	3,028,034.26	2,151,540.47	876,493.79	3.3
Siracusa	7,082,704.46	5,151,662.25	1,931,042.21	7.3
Trapani	6,106,294.71	4,320,295.37	1,785,999.34	6.7
<i>Total</i>	<i>141,200,723.53</i>	<i>114,666,949.04</i>	<i>26,533,774.49</i>	<i>100.0</i>

Source: calculations based on data from the DDGs for granting contributions (Action 1.1.5), www.euroinfosicilia.it.

Still remaining within the scope of companies based in Sicily only, the following table shows that micro-enterprises provided 29.5% of the total co-financing, small enterprises 37.0%, while medium and large enterprises, respectively 18.4% and 15.5%,

Tab. 26 – Cost, financing requested, co-financing of entities based in Sicily. Research institutions are excluded

	<i>Cost</i>	<i>Financing</i>	<i>Co-financing</i>	
	EUR	EUR	EUR	% of column
Micro	28,613,920.05	20,786,979.87	7,826,940.18	29.5
Small	35,650,517.09	25,833,249.91	9,817,267.18	37.0
Average	14,812,952.61	9,935,568.29	4,877,384.32	18.4
Great	9,088,072.29	5,075,889.48	4,012,182.81	15.1
<i>Total</i>	<i>88,165,462.04</i>	<i>61,631,687.55</i>	<i>26,533,774.49</i>	<i>100.0</i>

Source: calculations based on data from the DDGs granting the contribution (Action 1.1.5), www.euroinfosicilia.it.

To contextualize this counterintuitive result, it is necessary to keep in mind that the companies based in Sicily that participated in Action 1.1.5 are largely micro and small businesses. The companies with registered office in the region that are members of all the partnerships (therefore including several times the companies that have participated in multiple partnerships) are 194 of which 93 (47.9%) are micro-enterprises, 67 (34.5%) are small enterprises, 24 (12.4%) are medium-sized enterprises and 10 (5.2%) are large.

The greater cost sharing of micro and small companies is therefore determined by their number among the companies that participated in Action 1.1.5. This is not surprising if we consider the characteristics of Sicilian businesses, which are in the vast majority (84.1%) micro-businesses and small businesses (14.5%), while medium-sized businesses are just 1.2% and large 0.2%¹⁵. If anything, it should be underlined that as many as 10 large companies participated in Action 1.1.5 out of a total of 76 present in the region (including in the total also companies relating to sectors poorly connected with the thematic areas of the S3 strategy, Istat 2019).

¹⁵ Istat, Business. Sicily Report 2019

5.4 Critical issues and success factors

The evaluation made it possible to identify a series of factors that negatively influenced the overall ability of the financed projects to achieve positive results and effects in relation to what was expected with the interventions planned under Action 1.1.5.

The following table presents the list of critical factors encountered by the projects, ordered by rank based on the number of preferences indicated by the beneficiaries.

Tab. 27 - Main critical issues reported by the beneficiaries in Action 1.1.5

1. Critical issues relating to the reference context (Covid-19; Russian-Ukrainian conflict)	72.2%
2. Administrative critical issues of the project	25.9%
3. Financial critical issues	24.1%
4. Critical management issues of the project	18.5%
5. Critical issues attributable to the management of partnerships and networks	11.1%
6. Critical issues relating to the identification or involvement of the project's target recipients	7.4%

Source: IZI, Survey of OP ERDF beneficiaries 2014-2020, July-September 2023

As can be seen, the main critical issues reported in Action 1.1.5 were critical issues relating to the reference context, with particular reference to the problems generated by the Covid-19 pandemic. The other critical issues reported by the beneficiaries were, in order, those of an administrative nature of the project (25.9%), financial (24.1%), management (11.1%), attributable to the management of the partnership and networks (11.1%), and relating to the identification or involvement of the project's target recipients (7.4%).

The health emergency due to the Covid-19 pandemic has certainly put to the test the possibility of carrying out what was planned, slowing down the implementation of activities, especially in the medical, agri-food and tourism fields, with inevitable delays in procurement and supply of raw materials and IT equipment and electronic components, with the consequent increase in costs. This situation was aggravated by the subsequent economic crisis resulting from the Russian-Ukrainian conflict.

In addition to these critical issues relating to exogenous context factors, the beneficiaries reported among the main obstacles encountered the complexity and slowness of the bureaucratic and administrative procedures (with particular reference to the IT reporting procedures, the functionality of the Caronte monitoring platform, the delays in the definition of the ranking, and the excessively long timescales to obtain authorization for project remodulation, the complexity of the project remodulation process¹⁶). In third place were reported delays in the disbursement of financing (e.g. delays in the disbursement of advances, delays in subsequent disbursements, excessive timescales for the publication of the decree for the variation of the investment program and for the disbursement of the contribution, etc. .) and in fourth and fifth place management difficulties, with particular regard to the management of partnerships (difficulty of collaboration with universities and research bodies, abandonment of partners, organization of the partnership's work).

On the contrary, the majority of beneficiaries of Action 1.1.2 did not report any critical issues (79%), but even in this case the main problem was caused by Covid-19 (15.2%), which led to small companies on the brink of deep crises and large companies canceling projects regarding innovative activities. In a few cases, bureaucratic slowness and delays in balance payments have also been reported for this measure. As was reported by some stakeholders in the Sicilian Region, this was the only financed action that did not include advance payments, but

¹⁶ According to the delegate of the rector for the Third Mission of the University of Messina, it is important that there is the possibility for projects to undertake the remodulation of the project more easily, because if difficulties are encountered during implementation, it is necessary to be able to change the direction of research to then reach the goal. In the context of research, a certain flexibility is needed: if the envisaged path proves not to be practicable, it is necessary to find other paths, otherwise the planned results will not be achieved. For this reason, the remodulation should be simplified, providing for shorter timescales (in some cases it took two years) and streamlined procedures. The remodulation procedures have been foreseen in point 5.3. of Notice 1.1.5.

only the final balance. This has obviously caused problems, especially in a period in which companies have struggled with the issue of liquidity.

Similarly, almost half of the beneficiaries of Action 1.1.3 did not report any critical issues (40%). Among those who have done so, critical issues relating to the reference context prevail in this case too, such as Covid (50%) and the war in Ukraine, followed by critical issues linked to the complexity of bureaucratic procedures (20%). In particular, difficulties in sourcing and supplying raw materials and IT equipment and electronic components were reported, following the serious situation caused by the Covid 19 pandemic, as well as the complexity of the reporting procedures and the timing of communication of project eligibility and to respond to requests for substantial extensions of activities.

Some have highlighted the critical issues encountered in the supply of the monitoring system and in particular in the implementation of the Caronte system. The system brought about a big change compared to the previous programming (2007-2013) in which data collection took place using simple spreadsheets, but despite the progressive improved versions of the Caronte system, the beneficiaries encountered problems in use, perhaps even due to lack of expert monitoring and/or specifically trained personnel, as suggested by some stakeholders in the Sicilian Region.

Finally, there were administrative critical issues, also due to the lack of specialized personnel in the management of industrial research projects financed with European funds and the lack of familiarity of companies with keeping separate accounts.

To confirm that these were the main obstacles encountered by the projects, the beneficiaries provided the following main indications for improving the activities envisaged by Action 1.1.5, with a view to its re-proposal in the ERDF OP 2021-27:

- a) Improvement and simplification of bureaucratic procedures (12 reports);
- b) Improvement of reporting procedures (9 reports);
- c) Reduction of procedural times (7 occurrences);
- d) Clarity and publicization of procedures (6 occasions);
- e) Improved partnership management (4 reports);
- f) Reduction of funds disbursement times (3 reports);
- g) Improved support and enhanced technical assistance (2 reports).

In particular, with regards to bureaucratic procedures, the need to provide for administrative simplification and the methods of requesting the disbursement of advances, as well as a streamlining of reporting procedures and a clear improvement of the Caronte platform has been underlined by many, to be able to manage the administrative and technical part more effectively. Furthermore, another indication provided was to clearly explain the procedural rules from the start of the projects, improving the drafting of public notices, the Program operating manual and the project guidelines.

Also in Action 1.1.3, the main indications provided by the beneficiaries for the improvement of the planned activities, in view of their re-proposal in the 2021-27 ERDF OP, were the streamlining of the reporting procedures (e.g. documentation to support the reporting final, reporting guidelines, monitoring of physical and financial data) and the improvement of timing (adjustment of the time between the publication of the tender and the deadline for the presentation of the projects; increase in the duration of the projects to 36 months to allow for more effectiveness industrialization of innovation).

The improvement and simplification of bureaucratic procedures are also in first place among the indications provided by the beneficiaries of Action 1.1.2 for the improvement of the activities to be planned in 21-27 (21 reports), followed by the reduction of the timing of disbursement of funds (11 reports), the strengthening of support and technical assistance from the administration (5 reports), the improvement of publicity and information (2 occurrences).

Overall, most of the projects were able to deal with all the critical issues reported above, thanks to some specific factors, conditions and characteristics that allowed the highlighted obstacles to be overcome.

The evaluation made it possible to identify, in fact, a series of factors that had a strong positive influence on the overall ability of the financed projects to achieve the planned results and expected effects, despite the critical issues reported above.

The following table presents the list of factors determining the success of the projects carried out under Action 1.1.5, ordered by rank based on the number of preferences indicated by the beneficiaries.

Tab. 28 - Main success factors reported by the beneficiaries in Action 1.1.5

1. Quality of the project work team (knowledge, skills, leadership, etc.)	79.6%
2. Quality of the project partnership	77.8%
3. Management skills	63.0%
4. Design skills	55.6%
5. Flexibility and ability to adapt to local needs and context	40.7%
6. Reference context and favorable environment for the implementation of the project	33.3%
7. Quality of information, publication and awareness-raising activities	20.4%
8. Implementation of types of intervention previously successfully tested	18.5%
9. Support and accompaniment to the recipients of the interventions	13.0%
10. Networking and partnerships	10.0%
11. Use of additional and complementary financial resources	9.3%

Source: IZI, Survey of OP ERDF beneficiaries 2014-2020, July-September 2023

As can be seen, among the main success factors reported by the beneficiaries of the Action 1.1.5 projects are the quality of the project working group (79.6%) and of the project partnership (77.8%), followed by specific management skills shown by the work group (63%), planning (55.6%) and adaptation to needs and the local context (40.7%).

In particular, the management skills and quality of the human resources employed were highlighted, who were able to overcome the difficulties encountered, mainly deriving from external factors such as Covid-19. Furthermore, the high quality of the entire project partnership was underlined, in terms of skills and competences, which made it possible to deal with the aforementioned difficulties and unexpected project events, collaborating in a synergistic and effective way.

Regarding the quality of the partnership, some characteristics have already been highlighted previously (see 5.2.1) which the evaluation has identified as relevant in terms of continuity, sustainability and strengthening of innovation and which refer to the presence of the necessary skills technical and scientific, the management skills of the participating subjects and the coordination and leadership skills of the leader.

In this regard, it should be remembered that Notice 1.1.5 had included as evaluation criteria the qualitative composition of the partnership network in terms of representativeness and completeness of the production/technological chain (also considering the possible absence of one or more qualifying subjects of the supply chain), requiring a significant level in terms of variety, competence and experience of the subjects involved, and their ability to provide significant added value to the project activities, but also the consequences of the partnership network in terms of "benefits and impacts on of the proposing subjects in particular, and in general of the technological, industrial and territorial state of the art in which the project has its roots and from which it starts".

In the same Notice 1.1.5, a progressive reward system was also envisaged for the involvement of subjects, up to a maximum of 8 ("1 point for each subject beyond the first three included in the partnership up to a maximum of five points"). In this regard, it should be underlined that the evaluation highlighted how the large number of the partnership is a criterion necessarily subordinated to the completeness of the skills necessary for the implementation of the project, and constitutes, at the same time, a burden for the administrative and internal communication management to the partnership, which falls mainly on the lead partner. Furthermore, the continuity with projects already carried out in the past and the continuation of already tested collaborations

between the partners, together with the capitalization of the research results, certainly influenced the achievement of the objectives and constituted a factor in the sustainability of the interventions. As proof of what has been said, according to the project manager of the NAVTEC District, it was precisely the collaboration and integration between research institutions and companies, which represented the main strong point of the interventions.

The awareness-raising activities, publication of results and dissemination of information on the project also created a favorable environment for achieving the expected effects.

Also in Action 1.1.3, the main success factors were the quality of the partnership and the project working group (70%), followed also in this case by specific capabilities of the design working group (50%) and of management (40%).

Tab. 29 - Main success factors reported by the beneficiaries in Action 1.1.3

1. Quality of the project work team (knowledge, skills, leadership, etc.)	70.0%
Quality of the project partnership	70.0%
2. Design skills	50.0%
3. Management skills	40.0%
4. Flexibility and ability to adapt to local needs and context	20.0%
Reference context and favorable environment for the implementation of the project	20.0%
5. Support and accompaniment to the recipients of the interventions	10.0%
Use of additional and complementary financial resources	10.0%

Source: IZI, Survey of OP ERDF beneficiaries 2014-2020, July-September 2023

In Action 1.1.2, however, since almost all of the projects did not have a partnership (95.8%), the success factors were the quality of the project working group (69.7%), followed by the design capabilities (49.6%) and management (44.5%), which allowed the successful implementation of the projects.

Tab. 30- Main success factors reported by the beneficiaries in Action 1.1.2

1. Quality of the project work team (knowledge, skills, leadership, etc.)	69.7%
2. Design skills	49.6%
3. Management skills	44.5%
4. Reference context and favorable environment for the implementation of the project	35.3%
5. Support and accompaniment to the recipients of the interventions	20.2%
6. Flexibility and ability to adapt to local needs and context	16.0%
7. Implementation of types of intervention previously successfully tested	8.4%
8. Use of additional and complementary financial resources	5.0%
Quality of information, publication and awareness-raising activities	5.0%
Quality of the project partnership	5.0%
9. Networking	3.4%
10. Partnerships	2.0%

Source: IZI, Survey of OP ERDF beneficiaries 2014-2020, July-September 2023

Furthermore, the beneficiaries also reported among the success factors the capabilities, skills and professional quality of the suppliers and consultants involved, present in the regional catalogue, who ensured the highest quality of professional services (28 reports), while some stakeholders regional authorities have underlined the ability to plan interventions as a determining factor.

5.5 The contribution of the considered actions of the Thematic Objective OT1 to the regional strategy for smart specialization (S3)

This paragraph presents a summary of the contribution to the achievement of the general and specific objectives identified by the Regional Strategy for Smart Specialization (S3) provided by the results and effects achieved thanks to the implementation of the interventions financed within the scope of the actions considered of the Specific objective OS1.1 relating to the Thematic Objective OT1 of the OP ERDF Sicily 2014-2020.

The context of the 2014-20 programming

The 2014-2020 planning took place in a historical phase in which the growth expectations of the international economy presented highly critical elements, due to elements such as the slowdown in international trade, the weakening of production activity, the generalized decline of internal demand, even for the economically more solid countries.

To address this recession, planning has given priority to investments in research and innovation. On this aspect, Italy presented a situation in which a majority of companies were visible that were not very inclined towards innovation together with a minority of companies that instead placed innovation at the center of their activity. Furthermore, our country was able to boast scientific research that has peaks of excellence at a global level¹⁷.

Within the national framework, Sicily was among the least innovative regions, although with very slight growth: in 2008, according to the European Innovation Scoreboard, it had recorded the leap from the "modest innovator" category to the "moderate innovator" category. The constraints that historically characterized the regional production fabric had further consolidated:

- profitability of SMEs on average lower than the national average;
- high fragmentation and dwarfism of regional businesses;
- labor productivity on average below national values;
- modest push by companies towards internationalization and innovation processes;
- little regional propensity to create networks.

As regards Sicily's potential for qualified human resources, at the time of determining the ERDF Operational Program 2014-20, there was a notable delay compared to all other Italian regions with the exception of some other southern regions such as Puglia and Calabria. Sicily presented some positive signs in public spending on research and development and in the vitality of the ICT sector, highlighting the existence of some excellence in the territory¹⁸. In Sicily, overall spending amounted to 696 million euros in 2011 (equal to 3.5% of the national total) with a composition by institutional sector more unbalanced in favor of universities (56.8%) rather than businesses (29.1 %) and practically mirror the national situation (28.6% and 54.6% respectively). In the region, total spending was almost stable compared to 2010 (0.7%); in detail, spending was reduced in universities (-1.3%) and considerably in non-profit institutions (-44.1%) which however have a very low relative weight of 0.9%, while they were expenditure by public administrations (11.5%) and businesses (2.6%) is increasing¹⁹. As regards patents, Sicily contributed 0.6% of the national total between 2009 and 2011. Among the provinces, the most active was Catania with 34% of applications followed by Palermo (23%) and Messina (16%)²⁰. Furthermore,

¹⁷ Europe, measuring its innovation potential, however, places Italy among the "moderately innovative" countries, in 16th place for system results and 18th place for positioning in high-tech sectors (European Innovation Scoreboard), therefore significantly behind other European countries.

¹⁸ It should be highlighted that in Sicily the micro dimension of companies prevails, with few large companies concentrated in mature sectors, so achieving trend reversals in this area will only be possible with a medium-long term perspective. In particular, the resources dedicated to R&D must be increased above all with more substantial contributions from the private component which currently stands at absolutely negligible levels.

¹⁹ In Sicily, the marked increases recorded in public institutions and businesses (10.1% and 9.1% respectively) compensated for the losses of employees in private non-profit institutions (-33.4%) and in universities (-4.3%) resulting in an almost zero change in R&D personnel equal to 0.7% (from 8,304 to 8,359 units which represent 3.7% of the national total). The business sector showed wider fluctuations than the indicator examined: starting from 1998 there was an expansion in R&D expenditure by companies which, in 2011, allowed the indicator to reach a value 3.5 times higher than the one recorded in 1980.

²⁰ The values in absolute terms highlight the low Sicilian production compared to the national total with Catania producing only 8 patents and Palermo 6 compared to a regional total of 25 applications and a national total of 4,011.

between 2009 and 2011 the number of patent applications had fallen in Sicily by 9.2% per year compared to a national reduction of 3.9%.

OT 1 and S3

In light of this, the strategy for smart specialization (S3) 2014-2020 aimed to launch a process of regional valorisation, which looked at innovation as a multidimensional and highly interactive process of collaboration between different actors²¹.

The strategy aimed to increase the competitiveness of the Sicilian system and the quality of life of Sicilian citizens, based on the improvement of economic performance (through the development and valorisation of activities with greater added value) and on the protection and sustainability of the regional heritage. This vision translated into three general objectives, namely those of:

1. Strengthen the orientation towards innovation of the regional production system by strengthening the control of technological areas in which the region boasts distinctive skills and promoting technological upgrading and entrepreneurial discovery in traditional production sectors;
2. Support the dissemination of innovative solutions and services in response to unsatisfied social, economic and environmental needs and aimed at improving the quality of life of Sicilians;
3. Promote the widest diffusion of the culture of innovation at all levels of regional society.

In the context of such a context and the aforementioned objectives, the POR ERDF 2014-2020 was inserted which, through OT1, aimed to contribute to the objectives of the regional S3, and in particular through the Actions object of the analysis of this Report it intended to provide a specific contribution to achieving the second general objective.

As is known, different programs contribute to achieving the objectives of the S3 which make use of the various European and national funding sources, in various capacities insistent on the regional territory (PO ERDF, PO FSE, PSR EAFRD, PON R&I and PON Enterprises and Competitiveness, PON Metropolitan Cities, PON Governance, Horizon 2020, etc.) and among these the OP ERDF 2014-20 has undoubtedly provided a significant contribution.

The contribution of the ERDF OP 2014-20

The Actions 1.1.2, 1.1.3, and 1.1.5 have contributed to achieving Objective 1 of the S3 Strategy (strengthening the orientation towards innovation in the regional production system) by enhancing scientific and productive skills related to KETs, utilizing the latter particularly in sectors with greater potential for competitive development, and strengthening an innovation-based production framework.

In particular, the OP ERDF Sicily 2014 - 2020 contributed to strengthening the competitiveness of the regional production system by supporting the diffusion of innovation of innovative solutions and services in response to unsatisfied social, economic and environmental needs in the 6 thematic areas of the S3, in way quite in line with the priority areas proposed by the Region, consistently with the provisions of the Guidelines on the Smart Specialization Strategy (S3) developed by the European Commission. Specifically, the thematic areas most supported in hierarchical order with the interventions financed, within the various actions, based on the cost of the projects and secondarily on the number of projects were the following in order:

- 1) *Life Sciences*: 75,254,587.50 euros for 53 projects of which 24 in Action 1.1.2, 26 in Action 1.1.5 and 3 projects in Action 1.1.3;
- 2) *Agri-food*: 26,994,463.42 euros for 44 projects of which 30 in action 1.1.2, 11 in action 1.1.5 and 3 in action 1.1.3;
- 3) *Energy*: 26,456,586.81 euros for 37 projects of which 26 in action 1.1.2, 10 in action 1.1.5 and 1 in action 1.1.3;

²¹ In this context, a key role was played by the so-called key enabling technologies (Key Enabling Technologies - KETs): i.e. those technologies that develop solutions or technological improvements capable of revitalizing the production system in all economic sectors of human activity, increasing the commercial value and social nature of a good or service.

- 4) *Smart Cities & Communities*: 23,509,785.42 for 122 projects, of which 109 in Action 1.1.2, 10 in Action 1.1.5 and 3 projects in Action 1.1.3;
- 5) *Tourism Cultural Heritage Culture*: 16,887,413.59 euros for 20 projects of which 10 in action 1.1.2, 7 in action 1.1.5 and 3 in action 1.1.3;
- 6) *Blue Economy*: 13,571,890.39 for 5 projects referring exclusively to Action 1.1.5.

In particular, as we have seen, in the Life Sciences sector, most of the projects concerned the sub-areas of E-health (E-Care, telemedicine, etc.), Methodologies and technologies for diagnosis and Methodologies and technologies for the therapy, innovative and/or advanced (including Biological Resource Centers, Regenerative Medicine and Gene Therapy, 2D and 3D Scaffolds), in the Agri-food sector, the sub-field Innovation and sustainability of process/product/organization of production and agri-food supply chains (methodologies, materials, machines and systems, services), in the Energy sector the sub-areas Distributed Energy and Enabling Technologies aimed at reducing energy consumption and energy costs, Management of energy and network services and sustainable territorial planning, New innovative technologies in the field of eco innovation (Materials, processes and advanced devices in the energy-environmental and green building fields), in the Smart Cities field, the Smart Economy sub-field, in the Tourism field, cultural heritage and culture the sub-area Development of digital platforms and web services for tourism and cultural promotion, within the Blue Economy the sub-area Innovative design and energy efficiency.

As highlighted above, thanks to the implementation of the projects implemented with Action 1.1.5, significant technological innovation effects were obtained due to the adoption of highly innovative prototypes and the application of new key enabling technologies (KETs) , with particular reference to information and communication technologies (e.g. web application of cloud-integrated technologies, IT technologies and artificial intelligence algorithms, etc.), to advanced materials (e.g. bimetallic and metal-composite hybrid systems, low friction coatings, etc.), nanotechnology, micro- and nanoelectronics and biotechnology (e.g. applied to human health).

Furthermore, a technological improvement has been achieved at the level of products and processes, thanks to the experimentation of new applications and new technological protocols and production processes which are also innovative (e.g. greater quality of food products obtained together with the limited use of important resources natural resources; management platforms and IT systems functional to research and exchange of information).

A further relevant effect for the purposes of contributing to the aforementioned objectives of the S3 Strategy was the strengthening of the knowledge and skills of companies (for example, in the field of nanomaterials and applied sensing with possible future developments on new projects or in the mastery of new KETs).

As part of Action 1.1.2, the contribution to the S3 Strategy was provided thanks to the effects of technological innovation of companies (e.g. application of new technologies, digital innovation, development of digital and management IT systems such as apps, devices, dashboards , energy efficiency actions, interventions to improve products from an environmental or qualitative point of view, etc.), obtained on the basis of the support provided to companies through the catalog offer of advanced, knowledge-intensive services envisaged in Action 1.1. 2 and made possible above all by the quality of the project working group and the partnership (in terms of knowledge, skills, leadership, etc.).

Finally, as regards Action 1.1.3, the contribution to the S3 Strategy was provided through the identification and adoption of innovative solutions in the processes, which led to the industrialization of the research results, as well as significant innovation effects of the products, also in this case mainly thanks to the quality of the project working group and their design and management skills.

In general, the contribution to supporting the strengthening of partnerships and collaboration networks between the world of research and businesses was fundamental, as a determining factor of impact and sustainability to promote innovation, develop a series of necessary skills and also innovate products and industrial processes in all areas of the S3 Strategy. These collaborations within the scope of Action 1.1.5 were often not only of a regional but also extra-regional nature, especially in the fields of Energy, Smart Cities, Tourism and Cultural Heritage and Life Sciences, while the greater presence of bodies from the world of research it occurred, in particular, in partnerships in the fields of maritime economy, smart cities & communities, agri-food and life sciences.

The 2023 edition of the European Innovation Scoreboard confirmed Italy's position among the moderate innovators, even if in recent years our country has been growing at a faster pace than the EU average, albeit discontinuously, with an increase in performance in all regions and especially for Marche and Abruzzo. Italy also presents some areas of excellence, among which the Emilia-Romagna Region, Friuli-Venezia Giulia and the Autonomous Province of Trento stand out (classified in the European Innovation Scoreboard as Strong-), while Sardinia and Sicily run fast to fill the gap by placing first and eighth respectively in the European Top ten of emerging innovators at a regional level. In particular, as regards Sicily, it must be underlined how the innovative performance has increased over time (15.5%)²².

The 2014-20 ERDF OP undoubtedly also contributed to this improvement in performance. However, in light of what has been observed thanks to the analyzes contained in the Report, the contribution of the 2014-2020 ERDF to this innovation and to the objectives of the S3, although positive, appears by its nature limited and not capable on its own of remedying the delays observed in the data of initial context. In this sense, the synergistic and complementary contribution of all the public funding sources mentioned above and the available private funding sources is fundamental, also stimulated by raising awareness of a culture of innovation in the regional production fabric.

There is no doubt that Actions 1.1.2, 1.1.3, and 1.1.5 have also contributed to achieving Objective 2 of the S3 Strategy (supporting the diffusion of innovative solutions and services in response to unmet social, economic, and environmental needs). This has been achieved through the use of innovations to address emerging social challenges, especially in urban and marginal environments (particularly with reference to projects in the life sciences, agri-food, energy, and smart cities sectors). These actions make solutions increasingly closer and accessible to operators and citizens, thus promoting a tangible improvement in the quality of life for the people of Sicily.

Similarly, as highlighted, Actions 1.1.2 and 1.1.5, and partially Action 1.1.3, have also had a positive effect on Objective 3 of the S3 Strategy (promoting the broader dissemination of the culture of innovation at all levels of regional society). This is because they have facilitated and supported the entry of micro and small-to-medium enterprises (SMEs) into the innovation sphere through specialized consultations (Action 1.1.2) and involved them in broader innovation trajectories alongside large enterprises and research entities with whom they have had the opportunity to establish independent relationships (Action 1.1.5).

Towards the regional S3 2021-2027

For these reasons, while recognizing the goodness of the action of the POR ERDF Sicily 2014-2020, the regional S3 2021-2027 has relaunched the need to accelerate the innovation of the regional ecosystem with a view to sustainable development. In particular, the regional programmer, in line with the performances recorded by this analysis, recognized the need to:

- increase private investments in R&D, increasing the involvement of large regional companies and universities;
- stimulate greater collaboration between public and private sectors;
- promote industrial doctorates, the role of ITS and the development of medium-high skills at the service of the production system.

The Strategy also captured the orientation of the European Commission²³ which envisaged strengthening the research and innovation strategies for smart specialization (RIS3) in the future financial framework of the European Union 2021-2027, in order to "Strengthen innovation in Europe's regions" through "strategies for resilient growth, inclusive and sustainable".

This indication, also supported by the great interest aroused by the Smart Cities & Communities sector in the 2014-20 programming, and by the consultation of the permanent thematic working groups of the S3 Strategy,

²² European Innovation Scoreboard, 2023 edition

²³ COM (2017) 376 of 18/07/2017

led to the identification of environmental and social sustainability as a key element of the new Strategy and to the identification of the new area of intelligent specialization "Environment, natural resources and sustainable development". The principle of sustainability was understood as an objective and at the same time as an essential requirement for the regional economy of the future: the application of key enabling technologies and innovative tech solutions to the methods of production, distribution, work organization and of living environments has emerged as a stimulus and resilience tool for the entire regional territory, positively influencing increasingly pressing environmental and social problems, especially following the pandemic, and determining multiple favorable implications on the overall sustainability of the regional economic system .

PART TWO - FINAL EVALUATION AXIS 2

1. Overview of the implementation of OS 2.1 and 2.2 - Axis 2

This chapter provides an overview of the implementation level relating to Axis II and Thematic Objective OT2 of the Sicilian Region ERDF Operational Program 2014-2020 relating to improving access to information and communication technologies, as well as commitment and their quality. In particular, the reconstruction concerns what has been achieved in reference to the specific Objectives OS 2.1 - Reduction of digital divides in the territories and diffusion of ultra-broadband connectivity ("European Digital Agenda") and OS 2.2 - Digitalization of administrative processes and diffusion of digital services fully interoperable, connected respectively to the Investment Priorities identified by OP 2a (Extending the diffusion of broadband and high-speed networks and supporting the adoption of future and emerging technologies and networks in the digital economy) and 2c (Strengthening applications of ICT for e-government, e-learning, e-inclusion, e-culture and e-health) and the related specific objective 2 of the S3 Strategy.

This reconstruction allows, in the same way as what was proposed for Axis I, to verify the relationships and causal links between the actions undertaken with the resources used thanks to what was established in the OP ERDF Sicilian Region 2014-2020 (input), the actual achievements (output), the specific results (outcomes) achieved and the impacts (impact) obtained.

Within the specific Objective 2.1, two large projects have been implemented: the first is the large Regional Ultra-Broadband (BUL) project (Decision (2018) 6343), now concluded (Action 2.1.1a), whose beneficiary was Telecom Italia SpA, aimed at creating an ultra-broadband network (at least 30 Mbps) in the Sicily region and the second (Action 2.1.1b) is the "Large National Ultra-broadband Project" (Dec. C (2019) no. 2652) in an advanced stage of implementation, managed by the MISE, which consisted in the construction as well as maintenance and management, for a fixed term, of a passive ultra-broadband infrastructure (at least 100 Mbps) publicly owned and in the contextual provision of passive and active access services in wholesale mode, also through the use of existing infrastructure components and aimed at offering ultra-broadband services in white areas. Both projects were aimed at reducing digital divides in the territories, mainly in rural and internal areas, and at the diffusion of broadband and ultra-broadband connectivity consistently with the objectives set for 2020 by the "Digital Agenda".

Overall, a significant number of resources were invested in the two projects (221,002,421.40 euros), equal to 112.2%, which is greater than that established by the Sicilian Region ERDF Operational Program 2014 - 2020, in following the last reprogramming (196,979,354.00). The resources actually invested for the two projects correspond to 76.5% of all the resources of thematic objective 2.

Tab. 31 – Resources for projects financed PO ERDF SICILIA 2014-2020 – OS 2.1 per action

<i>Projects funded</i>	<i>Amount financed (E.)</i>	<i>%PO Resources (E.)</i>		<i>% of OS 2.1 resources</i>	<i>% of OT 2 resources</i>
Action 2.1.1a	75,000,000.00	33.9	73,831,300.34	37.5	28.7
Action 2.1.1b	146,002,421.40	66.1	123,148,053.66	62.5	47.8
OS 2.1	221,002,421.40	100.0	196,979,354.00	100.0	76.5

Source: based on data provided the 1st of August 2023 by the Sicilian Region - Regional Department of Economy, Regional Authority for Technological Innovation

In this regard, it should be highlighted that this positive result is inextricably linked to the aforementioned reprogramming, which, with particular regard to Action 2.1.1b, was necessary due to implementation delays linked to the Digital Agenda Strategic Project for Ultra-Broadband – intervention in white areas. In fact, as told

to the Monitoring Committee of July 2023, the progress of the works in Sicily, although recording notable results especially when compared with those of other Regions, has nevertheless had strong slowdowns, to the point that the planned ERDF resources, initially equal to approximately €161 million - subsequently reduced to €146,019,226 due to the initial ineligibility of VAT expenses - were further reduced to €123,148,053 including VAT. Therefore, the greater amount financed compared to the reprogrammed amount must take into account these progressive reductions.

As regards the actions subject to evaluation of the OS.2.2 objective, the Sicilian Region intended to invest predominantly (60.3%) in interventions functional to the digitalisation of existing services and administrative procedures for businesses and citizens, to within the various areas of regional public administration such as health and justice in particular (Action 2.2.1). However, the set of 41 approved projects provided for funding of 24,124,192.80 euros, corresponding to only 70.8% of the resources, even if recently reprogrammed downwards in the OP (from 42,660,806.00 to 34,064,622.00 euros). As regards Action 2.2.3, the percentage of resources committed to the OP's allocation is equal to 74.1%, but also in this case a reduction in programmed resources was established (from 31,119,693.00 to 21,439.360.00). For the OS 2.2 as a whole, this percentage is equal to 72.1%. It should also be noted that the total resources actually invested for the two actions corresponds to only 21.6% of the resources foreseen for thematic objective 2.

In this case, the remodulation of resources established and communicated to the Monitoring Committee in July 2023 is substantially connected to the procedures linked to territorialized resources in favor of Urban Areas, Internal Areas and CLLD, which concern actions 2.2.1 and 2.2.3. As mentioned, despite this reprogramming with a reduction of 24.7% (from 73,780,499.00 to 55,503,982.00 euros) the amount financed has so far been equal to 72.1% of that established by the OP.

Tab. 32 – Resources for projects financed under PO ERDF SICILIA 2014-2020 – OS.2.2 per Action

	<i>Amount financed (E.)</i>	<i>% PO Resources (E.)</i>	<i>% of OS 2.2 resources</i>	<i>% of OT 2 resources</i>
Action 2.2.1	24,124,192.80	60.3	34,064,622.00	61.4
Action 2.2.3	15,897,470.61	39.7	21,439,360.00	38.6
OS 2.2	40,021,663.41	100.0	55,503,982.00	100.0

Source: based on data provided the 1st of August 2023 by the Sicilian Region - Regional Department of Economy, Regional Authority for Technological Innovation

In particular, as anticipated, 41 projects were financed in Action 2.2.1 and 29 in Action 2.2.3.

Tab. 33 – Number of projects financed PO ERDF SICILIA 2014-2020 – OS 2.2 per Action

<i>Projects funded</i>	<i>No.</i>	<i>%</i>
Action 2.2.1	41	56.2
<i>of which</i>		
- territorialized	28	
- not territorialized	13	
Action 2.2.3	32	43.8
<i>of which</i>		
- territorialized	22	
- not territorialized	10	
<i>Total</i>	73	100.0

Source: based on data provided the 1st of August 2023 by the Sicilian Region - Regional Department of Economy, Regional Authority for Technological Innovation

This is the set of territorialized and non-territorialized projects. Regarding Action 2.2.1, there are 13 non-territorialized projects and 28 territorialized ones; with reference to Action 2.2.3, there are 10 non-territorialized projects and 22 territorialized ones. The following table presents the overview of the territorial projects financed for the two actions.

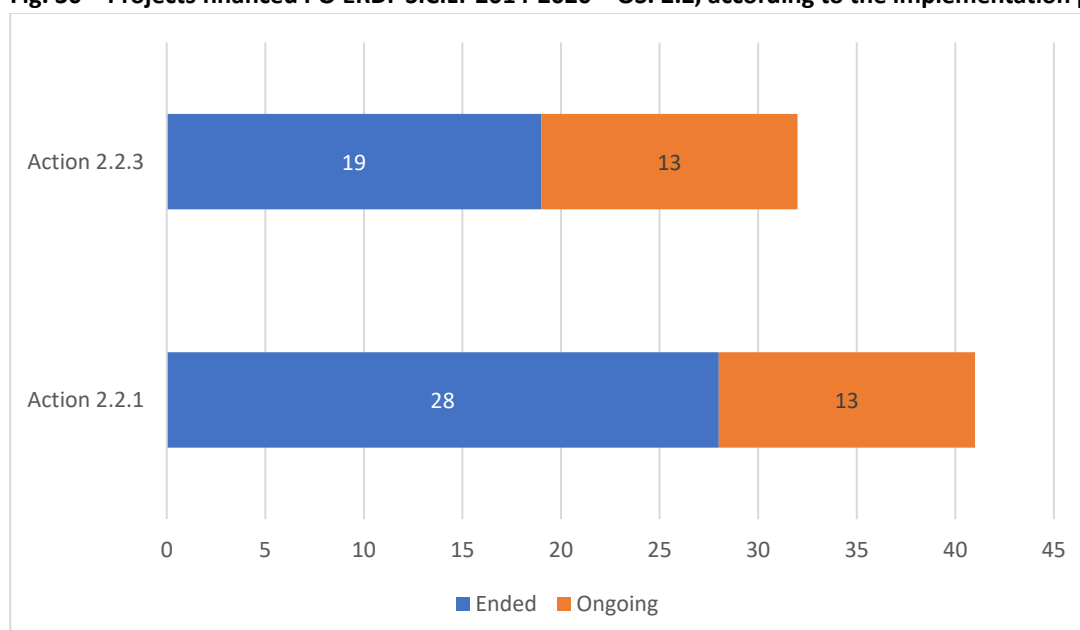
Tab. 34 – Territorialized projects financed PO ERDF SICILIA 2014-2020 – OS 2.2 per Action

	<i>Amount Financed</i>	<i>Projects</i>	<i>Equipment</i>	<i>Payments</i>
Action 2.2.1	15,718,050.39	28	17,000,235.41	1,018,030.59
of which				
Urban areas	11,918,261.06	17	12,073,761.27	1,018,030.59
Internal areas	2,429,180.14	4	3,036,474.14	0
CLLD	1,370,609.19	7	1,890,000.00	0
 Action 2.2.3	 7,805,030.30	 22	 8,436,280.60	 596,450.32
of which				
Urban areas	6,497,005.77	18	6,501,256.07	596,450.32
Internal areas	1,308,024.53	4	1,635,024.53	0
CLLD	0	0	300,000.00	0
 OS 2.2	 23,523,080.69	 50	 25,436,516.01	 1,614,480.91

Source: based on data provided the 1st of August 2023 by the Sicilian Region - Regional Department of Economy, Regional Authority for Technological Innovation

As can be seen in the following figure, approximately one third of the projects (35.6%) are still ongoing. This prevented carrying out an impact assessment for all of these projects (as is known, the impact can only be verified sometime after the conclusion of the interventions). However, an evaluation was carried out of the results achieved so far and those potentially achievable based on the level of performance of the projects and the critical issues encountered.

Fig. 30 – Projects financed PO ERDF SICILY 2014-2020 – OS. 2.2, according to the implementation phase



Source: calculations on data provided by the Sicilian Region - Regional Department of Economy, Regional Authority for Technological Innovation and Caronte data

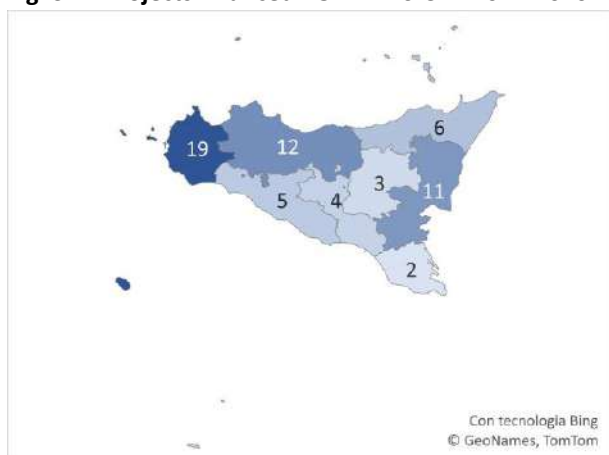
As can be seen in the following table, a significant number of funded projects (11) concern the entire Sicily region; for the rest (see Fig. 31), the majority of operations were carried out in the provinces of Trapani (19; 26.0%) and Palermo (12; 16.4%). Specific projects in the province of Siracusa were not financed.

Tab. 35 – Number of projects financed PO ERDF SICILIA 2014-2020 – OS 2.2, according to the province

	<i>Number of projects</i>	<i>Percentage</i>
Agrigento	5	6.8
Caltanissetta	4	5.5
Catania	11	15.1
Enna	3	4.1
Messina	6	8.2
Palermo	12	16.4
Ragusa	2	2.7
Trapani	19	26.0
Regional projects	11	15.1
<i>Total</i>	<i>73</i>	<i>100.0</i>

Source: calculations on data provided the 1st of August 2023 by the Sicilian Region - Regional Department of Economy, Regional Authority for Technological Innovation

Fig. 31 – Projects financed PO ERDF SICILY 2014-2020 – OS. 2.2, according to the province



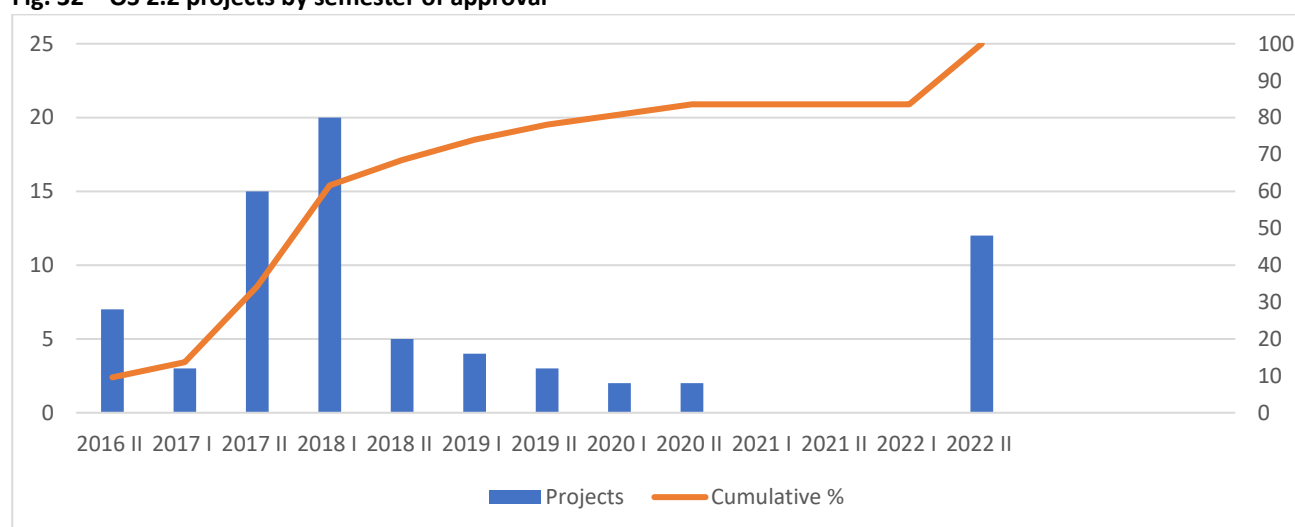
Source: calculations on data provided the 1st of August 2023 by the Sicilian Region - Regional Department of Economy, Regional Authority for Technological Innovation

2. Financial advancement

Examining the process of financial advancement of the Operational Program in relation to Specific Objective 2.1, it can be observed that the two BUL projects were started in the initial phases of the programming period (in the second half of 2015 and the second half of 2016 respectively), with consequent commitment of resources.

Regarding Specific Objective 2.2, analyzing the start dates of the projects, it can be noted that the majority of the projects were financed between the second half of 2017 and the first half of 2018 (35 projects, equal to 49.7%) and in II semester 2022 (12 projects, equal to 16.4%). It should therefore be underlined that at the end of the first half of 2020, 83.6% of the projects had been financed. The trend by semester is shown in the following figure.

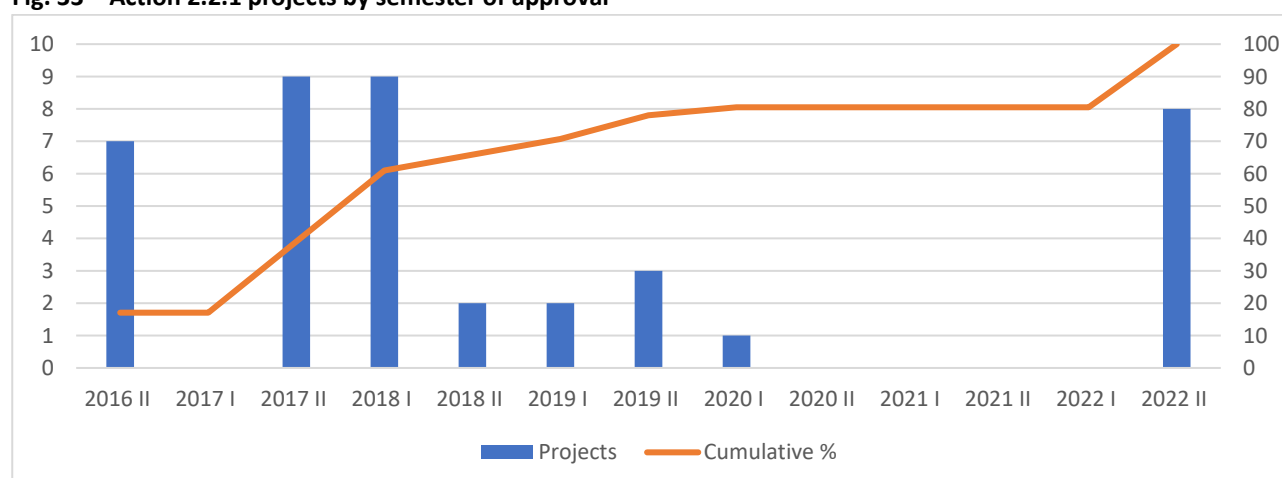
Fig. 32 – OS 2.2 projects by semester of approval



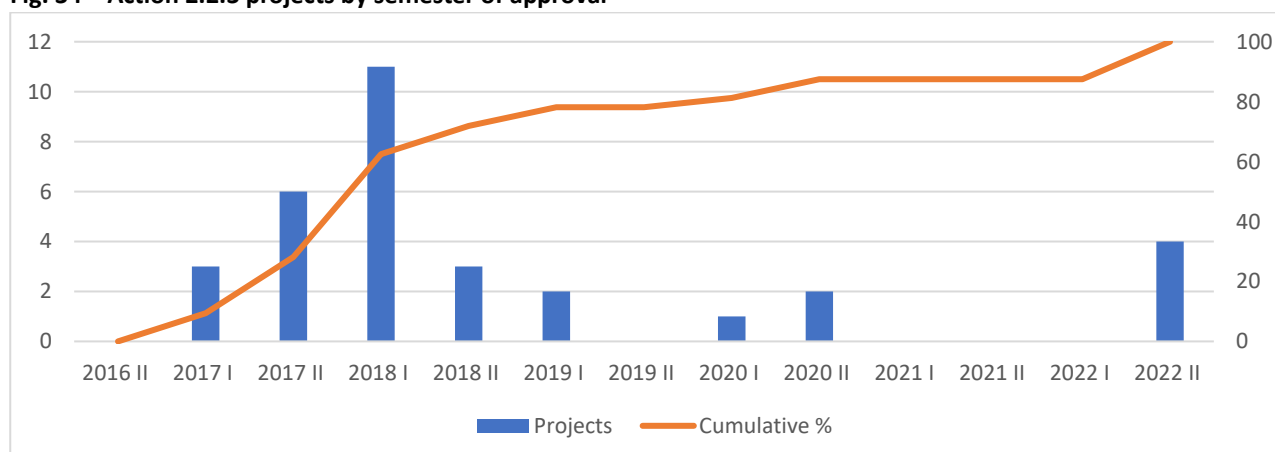
Source: based on data provided the 1st of August 2023 by the Sicilian Region - Regional Department of Economy, Regional Authority for Technological Innovation

Examining the process of financial progress per action, with reference to the following two figures, it can be noted that the trend observed in relation to the set of OS 2.2 operations is confirmed for both actions. Regarding Action 2.2.1, 18 projects were approved between the second half of 2017 and the first half of 2018; with reference to Action 2.2.3, 17 were approved in the same period.

Fig. 33 – Action 2.2.1 projects by semester of approval



Source: based on data provided the 1st of August 2023 by the Sicilian Region - Regional Department of Economy, Regional Authority for Technological Innovation

Fig. 34 – Action 2.2.3 projects by semester of approval

Source: based on data provided the 1st of August 2023 by the Sicilian Region - Regional Department of Economy, Regional Authority for Technological Innovation

It should be noted that the projects approved during the last semester of 2022 were all projects without territorialization, whose beneficiaries are Sicilian universities.

Projects financed in the second half of 2022

University of Catania

Implementation of the digital collection and technological updating of library services - UNI Catania (Action 2.2.1)

Technological and infrastructural enhancement of the University's internal cloud architecture - UNI Catania (Action 2.2.3)

University of Messina

Energy@ME - UNI Messina (Action 2.2.1)

PhyGUniME - UNI Messina (Action 2.2.1)

CyberUnime - UNI Messina (Action 2.2.3)

University of Palermo

Asset Management Platform - UNI Palermo (Action 2.2.1)

Innovation in teaching through mixed reality experimentation - UNI Palermo (Action 2.2.1)

Document Management and Business Process Management Platform - UNI Palermo (Action 2.2.1)

Virtual Assistant for Secretaries based on Artificial Intelligence - UNI Palermo (Action 2.2.1)

VDI for administration and teaching - UNI Palermo (Action 2.2.3)

Video surveillance, video analysis and access control platform - UNI Palermo (Action 2.2.3)

Kore University of Enna

Creation of digital environments for teaching, research and the third mission (Action 2.2.1)

The following table illustrates the summary picture of the progress of expenditure of the actions relating to OS 2.2, reconstructed on the basis of financial monitoring data.

Table 36 - Progress of spending Actions of OS 2.1 of the OP ERDF SICILIA 2014-2020

	<i>PO financing</i>	<i>Committed expense</i>	<i>% committed expenditure</i>	<i>Payments</i>	<i>% Payments</i>
		<i>/ PO financing</i>		<i>/ committed expense</i>	
Action 2.1.1a	73,831,300.34	75,000,000.00	101.6	73,831,300.34	98.4
Action 2.1.1b	123,148,053.66	146,002,421.40	118.6	76,192,434.03	52.2
<i>Total</i>	<i>196,979,354.00</i>	<i>221,002,421.40</i>	<i>112.2</i>	<i>150,023,734.37</i>	<i>67.9</i>

Source: calculations based on Caronte data

As previously highlighted, the total expenditure committed by the two large ultra-broadband projects is higher (112.2%) than the recently reprogrammed allocation of the OP. However, the payments made still correspond to 67.9% of the committed expenditure and 76.2% of the reprogrammed resources of the OP, mainly due to the implementation delays of action 2.1.1b (52.2% of payments compared to the committed expenditure).

Table 37 - Progress of spending Actions of OS 2.2 of the OP ERDF SICILIA 2014-2020

	<i>PO financing</i>	<i>Committed expense</i>	<i>% committed expenditure</i>	<i>Payments</i>	<i>% Payments</i>
		<i>/ PO financing</i>		<i>/ committed expense</i>	
Action 2.2.1	34,064,622.00	24,124,192.80	70.8	10,431,702.79	43.2
Action 2.2.3	21,439,360.00	15,897,470.61	74.2	7,263,561.89	45.7
<i>Total</i>	<i>55,503,982.00</i>	<i>40,021,663.41</i>	<i>72.1</i>	<i>17,695,264.68</i>	<i>44.2</i>

Source: based on data provided the 1st of August 2023 by the Sicilian Region - Regional Department of Economy, Regional Authority for Technological Innovation

Regarding OS 2.2, the committed expenditure amounts to 72.1% of the budget reprogrammed by PO (40,021,663.41 euros out of 55,503,982.00 euros of the budget). Just 44.2% of the committed expenditure was actually paid to the financed projects and this progress is clearly not satisfactory.

With reference to Action 2.2.1, the expenditure committed for the 41 financed projects, i.e. 24,124,192.80 euros out of the 34,064,622.00 of the allocation, is equal to 70.8%, while the payments are just 43.2% of committed spending. This is linked to the critical management issues encountered by the beneficiaries (organisation, activation of human resources, selection procedures for implementers, compliance with deadlines, etc.), highlighted by the stakeholders and beneficiaries interviewed.

Similarly, in the case of Action 2.2.3, the expenditure committed for the 32 financed projects is equal to 70.8% of the budget (15,897,470.61 euros out of 21,439,360.00). In this case the payments made are equal to only 45.7% of the sums committed.

In this regard, it should be remembered that 12 projects (8 of Action 2.2.1 and 4 of Action 2.2.3) were financed in the second half of 2022 and this certainly influenced this result.

3. Procedural progress

Regarding the procedural advancement of OS 2.1, as has been mentioned, the BUL 30Mbps project (Action 2.1.1a) is concluded, while the other (100 Mbps, Action 2.1.1b) is in an advanced stage of implementation.

As regards the projects relating to OS.2.2, we can observe in the following table the relevant portion of projects still underway (13 for Action 2.2.1 and 14 for Action 2.2.3), whose impacts may be evaluated only later and as part of this evaluation it was possible to collect evidence only on the first results. However, most of the projects are concluded (28 for Action 2.2.1 and 18 for Action 2.2.3 respectively).

Table 38 – Number of OP ERDF SICILY projects 2014-2020 – OS2.2 according to the implementation phase

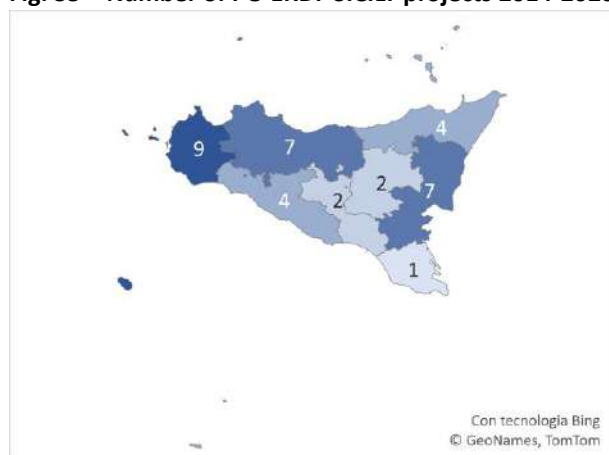
	Action 2.2.1	Action 2.2.3	Total
In progress	13	14	27
Finished	28	18	46
<i>Total</i>	<i>41</i>	<i>32</i>	<i>73</i>

Source: calculations on data provided the 1st of August 2023 by the Sicilian Region - Regional Department of Economy, Regional Authority for Technological Innovation

Moving on to examine the territorial distribution of the operations financed per action, as mentioned, the two OS 2.1 projects involve all the Sicilian provinces. On the contrary, OS 2.2 projects have their own localization, at least in most cases.

In fact, within Action 2.2.1, 5 projects concern the entire region. Regarding the other 36, it can be noted that the greatest concentration is recorded in the provinces of Trapani (9 projects), Palermo (7 projects) and Catania (7 projects)

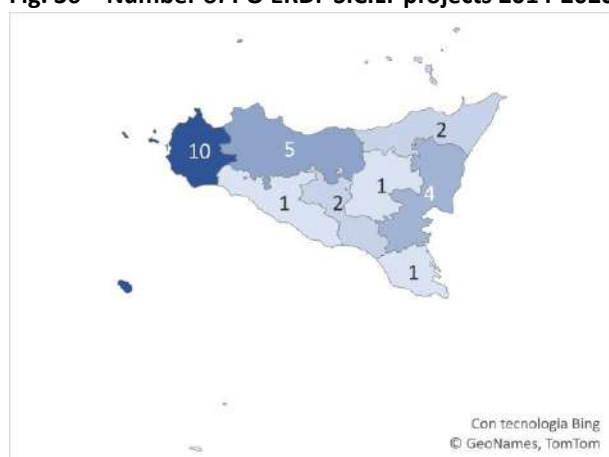
Fig. 35 – Number of PO ERDF SICILY projects 2014-2020 – Action 2.2.1, according to the province



Source: calculations on data provided the 1st of August 2023 by the Sicilian Region - Regional Department of Economy, Regional Authority for Technological Innovation

In the case of Action 2.2.3, 6 projects concern the entire region, while the other 26 are more concentrated in the provinces of Trapani (10 projects) Palermo (5 projects).

Overall, therefore, we note a high participation from the province of Trapani, which does not even enjoy the presence of the university. These are therefore territorialised projects.

Fig. 36 – Number of PO ERDF SICILY projects 2014-2020 – Action 2.2.3, according to the province

Source: calculations on data provided the 1st of August 2023 by the Sicilian Region - Regional Department of Economy, Regional Authority for Technological Innovation

Finally, regarding the type of beneficiaries, the two BUL projects (Action 2.1.1) were financed by Telecom Italia SpA and the Ministry for Economic Development (MISE).

As regards Actions 2.2.1 and 2.2.3, compared to non-territorialized projects, there are 11 projects managed by the Sicilian Region (5 of Action 2.2.1 and 6 of Action 2.2.3) and 12 by universities (8 and 4, respectively for the two actions).

In reference to the territorialized projects, 35 concern urban areas (17 for Action 2.2.1 and 18 for Action 2.2.3), 8 internal areas (4 and 4 for the two actions). The 7 local development projects (CLLD) were all financed under Action 2.2.1.

Tab. 39 – Projects financed PO ERDF SICILIA 2014-2020 – OS. 2.2, by type of beneficiaries

	Action 2.2.1	Action 2.2.3	Total
Urban area	17	18	35
Internal areas	4	4	8
CLLD	7		7
Sicilian region	5	6	11
University	8	4	12
<i>Total</i>	<i>41</i>	<i>32</i>	<i>73</i>

Source: based on data provided the 1st of August 2023 by the Sicilian Region - Regional Department of Economy, Regional Authority for Technological Innovation

4. Physical advancement

In the following table you can appreciate the physical progress of the actions being evaluated linked to the OS 2.1 objective, on the basis of the common mandatory output indicators used in the 2014-2020 ERDF OP in the Sicilian Region.

First of all, it can be observed that although the two BUL projects were started respectively in the second half of 2015 and in the second half of 2016, starting from 2018 the projects were completed which allowed broadband access to at least 30 Mbps of real estate units additional. In fact, while no progress was recorded in the two-year period 2016-17, it was in 2018 that 79.4% of the target remodulated in the last programming of the OP was reached (1,357,653 compared to 1,698,993). This creation of 1,357,653 additional real estate units equipped with broadband access at least 30 Mbps has no longer increased in subsequent years.

As can be seen in the following table, the access guaranteed to the additional residential units to broadband (at least 30 Mbps) is slightly lower (90%) than planned (1,123,786 compared to 1,248,651), while the access to the ultra-broadband of at least 100 Mbps of the additional housing units was lower (78.4%) than what was recently reprogrammed (233,867 compared to 298,363).

Regarding the 30 Mbps BUL, it should also be noted that the intervention is now concluded and therefore the indicator cannot advance further. In contrast, the 100 Mbps BUL project is still ongoing and the indicator can be assessed at the end of the activities.

Although the projects did not encounter significant issues, according to stakeholders, there were some administrative difficulties. In the ongoing project, a dispute arose concerning the VAT, which was later resolved with the judgment of the European Court of Justice on June 22, 2022, declaring the VAT admissible. On the other hand, the establishment of partnerships, consortia, and cooperation networks has been highlighted as a facilitating factor.

In general, according to the stakeholders, the contribution of the two BUL projects to the reduction of digital divides in the territories and the diffusion of broadband and ultra-broadband connectivity (OS 2.1) was very significant, in particular with regards to the structural digital divide. In this regard, however, it should be noted that, according to the stakeholders interviewed, the undisputed improvement or strengthening of the broadband network achieved thanks to the ERDF has corresponded to an only partial increase in the actual use of ultra-broadband in rural and internal areas.

Tab. 40 – Physical progress of the common and specific output indicators relating to OS 2.1 of the OP ERDF 2014 – 2020 Sicilian Region

Indicators (a)	Expected value PO (b)	Expected value Operations (c)	Measured value Operations (d)	% compared to expected value PO (d/bx 100)	% compared to expected value of operations (d/cx 100)	2014	2015	2016	2017	2018	2019	2020	2021	2022
CO10 - Number of additional housing units with broadband access of at least 30 Mbps	1,248,651	946,918	1,123,786	90.01	118.7	0	0	0	0	1,123,786	1,123,786	1,123,786	1,123,786	1,123,786
SPECIFIC - Additional real estate units with broadband access of at least 100 Mbps	298,363	367,235	233,867	78.4	63.7	0	0	0	0	233,867	233,867	233,867	233,867	233,867
SPECIFIC - Additional real estate units with access to broadband at least 30 Mbps	1,698,993	1,314,153	1,357,653	79.9	103.3	0	0	0	0	1,357,653	1,357,653	1,357,653	1,357,653	1,357,653

Source: Attachment to Section 2 OP ERDF 2014-2020 Sicilian Region, Version 14 July 2023

The common and specific output indicators relating to OS 2.2, based on the monitoring data and indicated in the Annual Implementation Report, except for adjustments on the quality of the data indicated, show a large delay. This is probably due to the fact that, as has already been observed, as many as 36.9% of the projects are still ongoing, some of which were financed in the second half of 2022. Furthermore, as mentioned, the stakeholders have reported the management difficulties encountered by the beneficiaries of Action 2.2.1 and therefore linked to the organisation, the activation of human resources, the selection of implementers, respect for deadlines, etc. and the critical issues linked to the age-old issue of the lack of qualified personnel responsible for managing digital services in the regional and local PA as regards Action 2.2.3.

However, stakeholders have highlighted the significant contribution of Action 2.2.1 with respect to the digitalisation of administrative processes and dissemination of fully interoperable digital services of the PA offered to citizens and businesses (OS 2.2.), as well as that of Action 2.2 .3. According to the stakeholders, in fact, the actions have generated an effective reduction in the management times of administrative procedures and an improvement in the quality of local public digital services, especially for citizens, rather than for businesses.

Finally, it can be observed that the indicator "PP.AA. Regional governments that have dematerialized their administrative procedures in the fields of health, justice and the valorisation of cultural heritage" both actions 2.2.1 (planned value of operations: 37) and 2.2.3 (planned value of operations: 60) contribute, for a recently rescheduled overall target of 60 PP.AA. Regional, defined considering the potential PP.AA. regional authorities active in the policy areas of health (9 ASPs and 5 Hospitals) and the valorisation of cultural heritage (10 Superintendencies for cultural heritage), as well as local authorities, including internal areas (referent municipalities of the 9 functional urban areas, of the 5 Internal Areas and the 23 CLLDs as well as the 4 regional universities).

Tab. 41 – Physical progress of the common and specific output indicators relating to OS 2.2 of the OP ERDF 2014 – 2020 Sicilian Region

Indicators	Expected value PO (b)	Expected value Operations (c)	Measured value Operations (d)	% compared to expected value PO (d/bx 100)	% compared to expected value of operations (d/cx 100)	2014	2015	2016	2017	2018	2019	2020	2021	2022
SPECIFIC -PP.AA. Regional governments that have dematerialized their administrative procedures in the fields of health, justice and the valorisation of cultural heritage	60	97	0	0	0	0	0	0	0	0	0	0	0	0

Source: Attachment to Section 2 OP ERDF 2014-2020 Sicilian Region, Version 14 July 2023

Moving on to examine the result indicators, we can first of all observe, in the following tables, that the data series do not allow an easy interpretation, also due to their only partial updating, so it is appropriate to make some considerations regarding their reliability and try to integrate them with available information.

As regards the percentage of the population covered with ultra-broadband at 30 Mbps and 100 Mbps, the available series only contain values for the years 2014 and 2015, while the subsequent values are simply data reported from the last available year. It is therefore clear that they cannot in any way have recorded the progress produced by the two broadband projects, started respectively in the second half of 2015 and in the second half of 2016.

According to the 2021 Annual Implementation Report, the now concluded project which saw Telecom as the beneficiary covered 142 municipalities, and enabled 1,123,786 real estate units at 30 Mbps, for a population of 2.31 million inhabitants (as well as 1,165 central and local public administration offices). The other project, which benefited the MISE and is still ongoing, enabled 233,867 real estate units to receive 30 Mbps.

Although the targets of the result indicators have recently been reduced following the latest reprogramming of the OP to 70% for the population covered with 30 Mbps broadband and 60% for the population covered with 100 Mbps ultra-broadband respectively, it is not possible to verify the connection of the effects of the OP on the changes in the aforementioned statistical indicators, in the absence of an update of the series available in the years following 2015.

Also, regarding the OS 2.2 result indicators, the available series present values that require particular caution in their evaluation. With reference to the percentage of citizens who use the health record, it should be noted that the Istat metadata relating to territorial indicators specify that the use of the electronic health record also includes the search for information.

This allows us to consider, albeit in a qualitative way, the contribution of the SovraCUP project, not yet tested but perfectly operational (<https://sovracup.regione.sicilia.it/home>), dedicated to the booking of specialist visits and diagnostic tests in Health Companies of the Sicilian Region. The service allows the local health authorities to display their services and the citizen to make a choice, reservation and payment, having a SPID or CIE and a dematerialized prescription drawn up by a general practitioner or a specialist.

Although no official data regarding access is currently available, the SovraCUP project, implemented since the end of 2019 and in an advanced testing phase, has had a significant impact on this indicator, as it has allowed access to services at all Sicilian citizens, both independently from a computer, tablet or smartphone, and through general practitioners and pharmacies. The SovraCUP service, as it is not tested, has not yet been the subject of an adequate communication campaign, but it is possible to access it, as well as directly, through the booking portals of the Sicilian ASPs, in most cases through highly visible links. As part of the evaluation, the result was detected through a CAWI survey which involved Sicilian citizens, potential users of the service (see paragraph 5.3 below and Appendix 2 - SovraCUP survey report).

Regarding the percentage of Municipalities with fully interactive services (these are those that allow the entire process relating to the requested service to be started and concluded electronically), starting from 2018 the indicator has exceeded the expected value indicated in the OP (27% versus the expected 20%) and probably subsequent data, not yet available, will show further progress. Considering that almost 37% of the projects financed by the 2014-20 ERDF OP under Actions 2.2.1 and 2.2.3 are still ongoing and therefore cannot yet have caused significant detectable impacts, it is difficult to hypothesize that the changes in the statistical indicator starting from 2018 can be attributed to the effects of the aforementioned ERDF OP Actions, even if undoubtedly these actions have favored the diffusion of digital services in the municipalities (see chapter 5).

Tab. 42 – Physical progress of the result indicators relating to OS 2.1 of the OP ERDF 2014 – 2020 Sicilian Region

Result indicator	Expected value	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Coverage with 30 Mbps ultra-broadband (Population covered with 30 Mbps ultra-broadband as a percentage of the resident population)	70.0		10.4	10.4	21.0	21.0	21.0	21.0	21.0	21.0	21.0
Coverage with 100 Mbps ultra-broadband (Population covered with 100 Mbps ultra-broadband as a percentage of the resident population)	60.0		0.0	0.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0

Source: Based on Istat data <https://www.istat.it/it/archivio/16777>**Tab. 43 – Physical progress of the result indicators relating to OS 2.2 of the OP ERDF 2014 – 2020 Sicilian Region**

Result indicator	Expected value	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Citizens who use the Electronic Health Record (%)	10.0			4.4	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Municipalities with fully interactive services (%)	20.0	10.3	10.3	10.3	16.8	16.8	16.8	27.0	27.0	27.0	27.0

Source: Based on Istat data <https://www.istat.it/it/archivio/16777>

5. Evaluation of the results and impacts achieved

This chapter examines the main results achieved and the impacts obtained and detectable so far, thanks to the implementation of the actions and interventions financed within the scope of the actions considered of the specific Objectives OS 2.1 - Reduction of digital divides in the territories and diffusion of broadband connectivity ultra broadband ("European Digital Agenda") and OS 2.2 - Digitization of administrative processes and dissemination of fully interoperable digital services, relating to the Thematic Objective OT2 and connected respectively to the investment priorities identified by OP 2a (Extending the diffusion of broadband and high-speed networks and support the adoption of future and emerging technologies and networks in the digital economy) and 2c (Strengthening ICT applications for e-government, e-learning, e- inclusion, e-culture and e-health) and the related specific objective 2 of the S3 Sicily Strategy.

In this regard it should be remembered that some projects are not yet concluded and in particular almost 37% of the projects relating to OS2.2 are still ongoing (13 for action 2.2.1 and 14 for action 2.2.3) and therefore their impacts can only be assessed later, at least six months after their conclusion. Consequently, in the context of this evaluation it was possible, for these interventions, only to collect evidence on the first results and their potential impacts and, consequently, the evaluative judgments formulated can be considered in most cases as prospective, even if this does not mean that they cannot have any validity and usefulness in guiding the political decision maker in the choices of new interventions.

More generally, also with regard to the OP actions relating to the specific Objectives OS 2.1 and OS 2.2, the determination and subsequent evaluation of the results and impacts was carried out on the basis of the chosen evaluation approaches (see Methodological Appendix), and using all available information and data (desk analysis, stakeholders, beneficiaries²⁴, key informants or privileged witnesses). However, this procedure allowed us to reach evaluative conclusions, identifying, as far as possible, the causes or at least the determining factors of obstacle or facilitation to the implementation of the interventions.

5.1 The reduction of digital gaps in productive areas and in rural and internal areas

As part of Action 2.1.1 relating to the specific Objective 2.1 of the OP ERDF Sicily 2014-20, two large projects were carried out, as is known: the first is the large Regional Ultra-Broadband (BUL) project (Action 2.1.1a), whose beneficiary was Telecom Italia SpA, and the second (Action 2.1.1b) is the "Large National Ultra-Broadband Project", managed by the MISE.

These projects, through the installation of ICT infrastructures for access to broadband and ultra-broadband in productive areas and in less densely populated rural and internal areas, have undoubtedly contributed to the achievement of the reduction of digital gaps in the territories, consistently with the objectives set to 2020 by the European "Digital Agenda" and above all with the second objective of the S3 Strategy aimed at "supporting the diffusion of innovative solutions and services in response to unsatisfied social, economic and environmental needs and aimed at improving the quality of life of Sicilians".

Furthermore, it must be said that when the installation works are finished, Open Fiber will obtain the concession for twenty years but then the network will remain with the Sicilian Region. Therefore, there is no doubt that the indisputable contribution of enrichment for the population of the Region can be noted, which could bring a potential impact on all the thematic areas of the S3 Strategy, obviously starting from the one called Smart cities.

In particular, even taking into account the latest financial reprogramming of the OP (€196,979,354), 1,123,786 (90% compared to the remodulated target of 1,248,651) additional housing units had access to broadband at

²⁴ As regards the survey of the beneficiaries, it should be noted that it was less satisfactory in terms of representativeness and quality of the data compared to that carried out for the thematic objective OT1, above all due to the difficulty in obtaining the completed questionnaires from the municipal and public representatives administrations in the almost summer period in which the survey necessarily had to be carried out (August-September 2023). Furthermore, the University of Messina has formally communicated that it is available to participate in the survey only upon completion of the three projects it is carrying out.

least 30 Mbps, 233,867 (78.4% compared to the remodulated target of 298,363) housing units that had access to broadband at least 100 Mbps. Overall, 1,357,653 additional housing units were equipped with broadband access at least 30 Mbps compared to the target of 1,698,993 (79.4%).

Stakeholder testimonials

The municipalities envisaged in the plan are 318, of which 240 have been started so far, which means that in these 240 municipalities the signing of the agreement between the Sicilian Region, INFRATEL and the individual municipality has been completed. The Sicilian Region, in fact, must individually stipulate agreements with all the municipalities of Sicily. To date, there are 214 closed municipalities and of these 192 have been tested, that is, in these municipalities the works have been completed and have been tested by INFRATEL, while the "sellable" municipalities are 190. These are the ones completed and tested and whose fiber can be sold. In fact, INFRATEL is not the commercial operator, but the operators who rent the last stretch and activate it intervene.

This intervention was therefore fundamental for the reduction of digital divides, especially in a period marked by the Covid emergency, which made the possibility of accessing the internet even more important for the management of multiple entrepreneurial, work and personal activities remotely.

Three-year plan 2021-23 Digital transition

ICT infrastructure and the pandemic

The fundamental importance of the intervention, together with the others conducted by the Region for the consolidation of the infrastructure, was also confirmed in the dramatic health emergency, constituting the fundamental asset to ensure, in a large part of the regional territory, the possibility of withstanding the exponential data transmission needs that the lockdown has generated.

According to the 2021-23 Three-Year Plan Digital Transition, "it appears significant to highlight that since the latest survey on the progress of ultra-broadband (BUL) Fiber to the Home, literally "fiber to the home" (FTTH), Sicily is first among the large Italian regions and in second place overall".

Three-year plan 2021-23 Digital transition

Regione	Comuni FTTH a Piano	Comuni in progettazione definitiva	Comuni in progettazione esecutiva	Comuni con cantieri avviati	Comuni con cantieri con lavori chiusi	Comuni con cantieri in collaudo	Comuni con cantieri collaudati positivamente	% Comuni Collaudati positivamente
Abruzzo	174	1	24	32	8	2	107	61%
Basilicata	103		4	21	24	11	43	42%
Calabria	238	18	114	16	9	8	73	31%
Campania	449	49	119	82	52	25	122	27%
Emilia-Romagna	242	6	18	97	28	25	68	28%
Friuli-Venezia Giulia	182	1	34	21	13	6	107	59%
Lazio	329	3	121	58	18	10	119	36%
Liguria	201	1	76	76	12	18	18	9%
Lombardia	1147	40	476	197	90	58	286	25%
Marche	221	1	12	83	36	9	80	36%
Molise	132		31	27	13	2	59	45%
Piemonte	1115	27	447	219	82	83	257	23%
Puglia	223	11	118	11	11	9	63	28%
Sardegna	135	4	47	23	8	6	47	35%
Sicilia	318	23	47	32	20	6	190	60%
Toscana	210	6	49	67	13	12	63	30%
Trentino-Alto Adige	214	4	36	96	8	24	46	21%
Umbria	78	1	3	18	8	4	44	56%
Valle d'Aosta	68		25	15	9	3	16	24%
Veneto	453	1	109	134	25	29	155	34%
Totale	6232	197	1.910	1.325	487	350	1963	31%

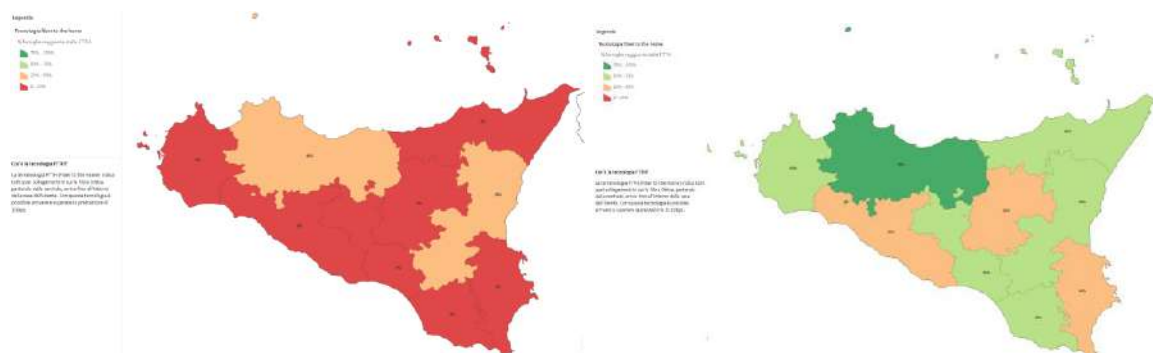
Source: Infratel Italia. BUL Progress Report February 2022

The following table shows the percentage of families reached by FTTH (Fiber to the home) technology, i.e. the fiber optic connection that starts from the exchange and reaches the home and allows performance of up to 1Gbps. As can be seen, the possibility for families to connect to ultra-broadband has increased significantly in the Sicily region, starting from a situation of complete absence in 2017 in many of the provinces. In 2022, the Sicilian province in which the largest share of families is reached is Palermo (76%) and the province where the share is lowest is Enna (28%).

Tab. 44 – Families reached by FTTH (%) in the years indicated

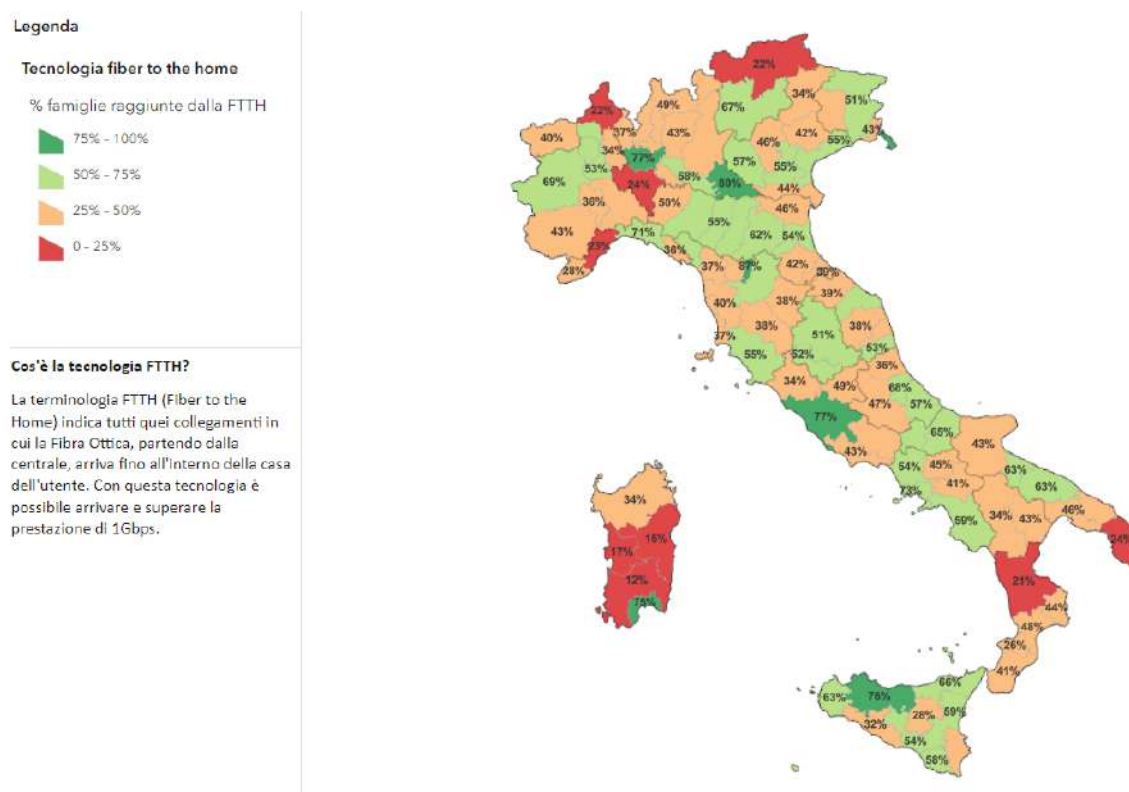
	2017	2020	2022
Palermo	45	56	76
Messina	8	46	66
Catania	28	40	59
Enna	0	6	28
Siracusa	0	31	44
Ragusa	0	23	58
Caltanissetta	0	32	54
Agrigento	0	14	32
Trapani	4	5	63

Source: Agcom.maps.arcgis.com

Fig. 37 – Families reached by FTTH (%) - Years 2017 and 2022

Source: Agcom.maps.arcgis.com

In 2022, the situation in the Sicily region regarding the possibility of families connecting to the BUL is represented in the following figure, which clearly shows a rather advanced situation compared to most Italian regions, including those in the centre-north.

Fig. 38 – Families reached by FTTH (%) - Year 2022

Source: Agcom.maps.arcgis.com

Despite the indisputable results, it should however be noted that, according to some stakeholders, the improvement or strengthening of the broadband network achieved thanks to the ERDF has corresponded to only a partial increase in the actual use of ultra-broadband in rural and internal areas. Therefore, the impact of completely reducing digital divides in the territories cannot yet be said to have been achieved.

Nonetheless, in many internal and rural areas the installation of fiber has already produced significant effects, for example, allowing some agricultural companies to carry out projects that otherwise would not have been

possible, as well as making it possible to enhance the possibility of data transmission to research centers of international importance, located in rural areas, such as the Madonie astronomical observatory in Isnello.

Stakeholder testimonials

When fiber arrived in the municipalities and within Sicily, in areas where there are agricultural companies, there were significant effects, because the companies, thanks to a fast connection, were able to carry out projects that they would not have been able to carry out before. The operation is already bearing fruit in practice, but when it is completed, it will concern citizens and businesses to a greater extent. At the moment there is no data, however.

(...)

We brought the fiber to the Madonie Astronomical Observatory in Isnello because the European Space Agency intended to upgrade the Isnello Observatory to create a satellite center connected with the other European satellites. They then asked us to bring ultra-broadband because they clearly have to send data. The center has been equipped with ultra-broadband, but now there are other problems regarding authorizations to build other infrastructures. And it was really complicated there because the cable was brought in by helicopters, but we managed it.

5.2 The digitalisation of university services for students

The implementation of the OP ERDF Sicily contributed to the achievement of one of the objectives of the S3 Strategy, namely that of the dissemination of innovative solutions and services, aimed at improving the quality of life of Sicilians, especially in universities, health services and Sicilian region.

In particular, thanks to the implementation of the projects financed under Action 2.2.1, an effective diffusion of digital services for university students was achieved, both through document management platforms (e.g. University of Catania and University of Palermo), which through educational innovation interventions through virtual assistance, specific classrooms for virtual reality and reality experimentation, apps and digital platforms, digital environments for teaching, research and the third mission (e.g. University of Messina).

Stakeholder testimonials

In universities, the diffusion of digital services towards students has been achieved which has an impact on Action 2.2.1. In universities they have implemented important projects in artificial intelligence, virtual assistance, educational innovation through reality testing, Asset Management and the document management platform which is fundamental.

One of the most important things with the university was also that of knowledge exchanges. We are pushing on this. We are using them as a pilot project for platforms that can then also be used by the Sicilian Region.

Furthermore, projects have been carried out at the University of Catania for the technological updating of library services, which are an expansion of administrative processes and a diffusion of services towards citizens.

The university has gone virtual reality with the creation of virtual reality-specific classrooms. It is a highly innovative project of which universities are very proud.

Stakeholder testimonials

The University of Messina has created the Energy@ME project on the rationalization of energy consumption within the university, through fully automated remote re-control, which has led to reductions in energy use. This is something that can be used, for example, in all administrations because this is a fundamental topic.

5.3 The digitalisation of health booking services for citizens

The 2014-2020 ERDF PO, thanks to the implementation of the SovraCUP project, dedicated to the booking of specialist visits and diagnostic tests in the Health Authorities of the Sicilian Region (<https://sovracup.regione.sicilia.it/home>), has undoubtedly produced an improving the quality of digital services for citizens, contributing to the achievement of Objective 2 of the S3 Strategy of improving the quality of life of Sicilians, especially in accessing health services in the Sicilian Region.

The service, in fact, allows local health authorities to display their services and the citizen, via the Web or through a simple App, to make both the choice and the booking and payment, having a SPID or electronic identity card (CIE) and a dematerialized prescription written by a general practitioner or a specialist. In short, it is a digital virtual space in which citizens can enter comfortably from home using their mobile phones and easily find all the information they need on the healthcare services offered by companies and quickly book and pay for these services. For those who do not know how to use digital technologies, there is the possibility of accessing and booking at pharmacies and general practitioners. At the same time, the CUPs of the companies providing the data benefit from a performance data monitoring service. Such monitoring can potentially help reduce waiting lists, as citizens can use the services of all CUPs.

Stakeholder testimonials

Regarding the digitalisation of existing services in public administration for citizens, we have created an App within the SovraCUP project, precisely to expose all the companies that citizens can use to book a healthcare service. The project is dedicated to citizens and healthcare companies. It is an innovative service also for healthcare companies, as it constitutes a monitoring service that can also be used by them.

The SovraCUP is a virtual digital space in which the citizen can enter and there he finds himself in front of interactive whiteboards on which all the health services that each health company in the Region offers appear. Via the Web or through an app, there is the possibility to choose, book and pay. So, the system is interactive in this sense. This system is Energized by data from the individual CUPs of the companies. They are the feeders and the exhibitors, but at the same time they benefit from a service within the SovraCUP which is called system monitoring, that is, all the data is monitored and statistics are made, especially to reduce waiting lists. The parameters that converge within the SovraCUP can, in fact, help to reduce waiting lists by using the services of other CUPs.

Previously, citizens could access 18 companies, while today they can access services throughout Sicily from home or from their mobile phone. You enter with your electronic identity card or SPID and can freely access the health service of the entire region. Doctors and pharmacies are authorized through specific coordinates and passwords to access the health service of the entire regional health system. If someone doesn't know how to use digital technologies, he can get help and book through the pharmacy. The access points are 2400 pharmacies and 7800 doctors and 5 million inhabitants who can freely access the service offered by digital healthcare.

This is a Copernican revolution, where the patient is at the center of the healthcare universe.

Another important thing is that we are federating with the PDND, the national digital data platform, on which the SovraCUP interoperates and exchanges data at a national level. It is an innovative platform because it is now interoperable with all the criteria that the State is dictating at the moment. (...)

The Region worked to try to standardize the language which was unique for each company; for example, a health service, such as a chest x-ray, had several names. We attempted to reclaim the nomenclature present in each company, so that we could speak with a single language and guarantee interoperability with national platforms.

(...) Then above all the platform has an internal business intelligence that coordinates all booking activities, aiming to reduce waiting lists. The project is not yet tested, but it is accessible to the public and fully functional. We are doing the test on an open construction site and this is also the digital innovation. We have been using the platform for a year and have received information on any critical issues or malfunctions from all users of the system, including those from the CUPs.

(...) We are also thinking about booking totems. Imagine that we also spread the result in a corner of a city, of a piece of the city and the citizen goes to the totem and books there. Imagine he doesn't even go to the pharmacy. When we talk about Smart City, I see it in this direction: services provided through innovative systems.

(...) For the first time we are witnessing a collaboration or interoperability between the different companies but above all a coordination that takes place at a high level of government and for which having included the SovraCUP, through a monitoring system of the regional health service, is bringing revolutions also in the field of resource allocation, because if some sectors are overloaded and need a help, they will detect it.

The difficulty must come in the sense that these things must then be able to sustain themselves. But the project has created a positive pandemic and once pandemics have been unleashed, no one can stop them anymore. The system works by itself even if politics wanted to intervene it would not be able to do so, it would not be able to compromise and tamper with it, because it is a virtuous system.

Even if no data regarding access is currently available, this service, created starting from the end of 2019 and in an advanced testing phase, is certainly destined to have, without prejudice to the difficulty of guaranteeing the continuity and sustainability of this project in the time, a significant impact for improving access to health services and, more generally, as desired by the S3 Strategy, for improving the quality of life of Sicilians, thanks to the use and dissemination of such an innovative digital service. Furthermore, consistently with objective 2.2. of dissemination of fully interoperable digital services, interoperability and data exchange with the National Digital Data Platform (PDND) are also being tested²⁵, standardizing the nomenclatures of the various healthcare services, often different for each ASL.

The Sicilian Region is also thinking of further spreading this system of innovative digital services, through the activation of booking totems located in different corners of the city and this would certainly respond to the objective of the Smart city evoked by the S3 strategy.

In the meantime, the evaluation made it possible to verify the first significant effects of the new SovraCUP service on the lives of Sicilian citizens. In fact, a specific survey was conducted on a representative sample of Sicilian citizens, which made it possible to verify the level of knowledge of this innovative service, together with the level and methods of use, as well as the opinion regarding the usefulness of the SovraCUP service. The survey report is in the appendix to this document, while the essential elements are summarized here.

For a correct reading of the information emerging from the survey, it is necessary to specify that the service, although active and functioning, has not yet had definitive testing, as it was conceived as an open project and the observations and difficulties received have been collected by citizen users for the development of the system. This means that the SovraCUP has not yet been the subject of an adequate public communication campaign.

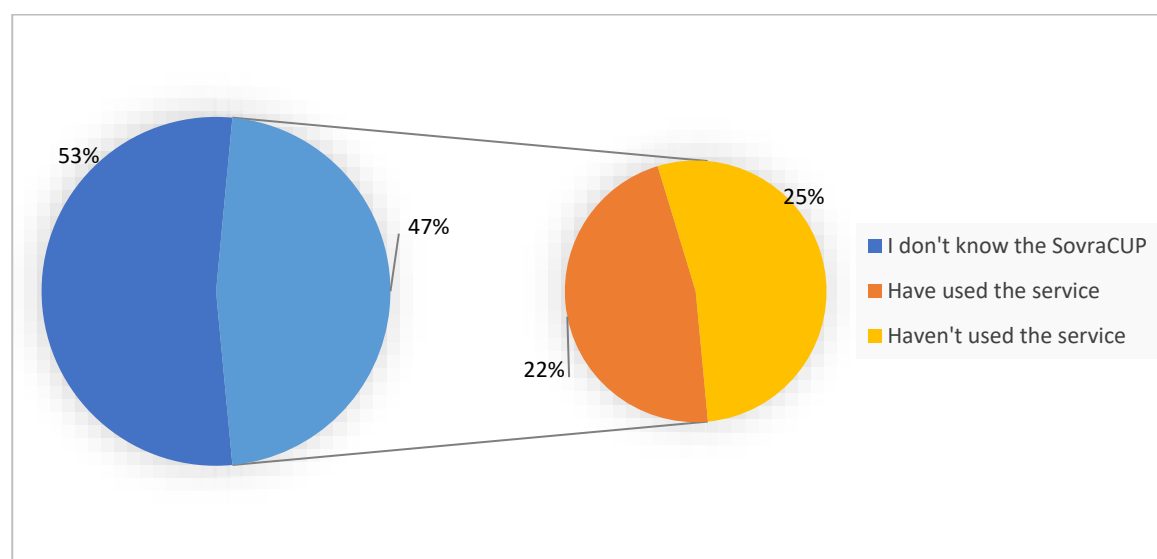
However, links to the service are already present on the portals of almost all provincial health authorities (e.g. Palermo, Catania, Enna, Agrigento, Siracusa, Caltanissetta), therefore users of the ASP have already received instructions for accessing the SovraCUP.

Summarizing the results of the survey reported in Appendix 2, the service is known by 47% of the citizens interviewed and in particular by the population over 35 years of age, and was used by 22% of the interviewees, in particular by citizens in the aged 35-54 years.

²⁵ The Platform is foreseen by the Digital Administration Code (art. 50ter) and responds to the triple need of cloud management of big data and administrative activities, of respecting the once only principle and of guaranteeing maximum interoperability between public administrations, citizens and businesses.

It is worth underlining that these results are very significant considering the limited information circulated regarding the existence of the SovraCUP service. One can easily imagine how an adequate communication campaign, planned as soon as the service is tested, could multiply users and accesses.

Fig. 39 – Knowledge and use of the SovraCUP service

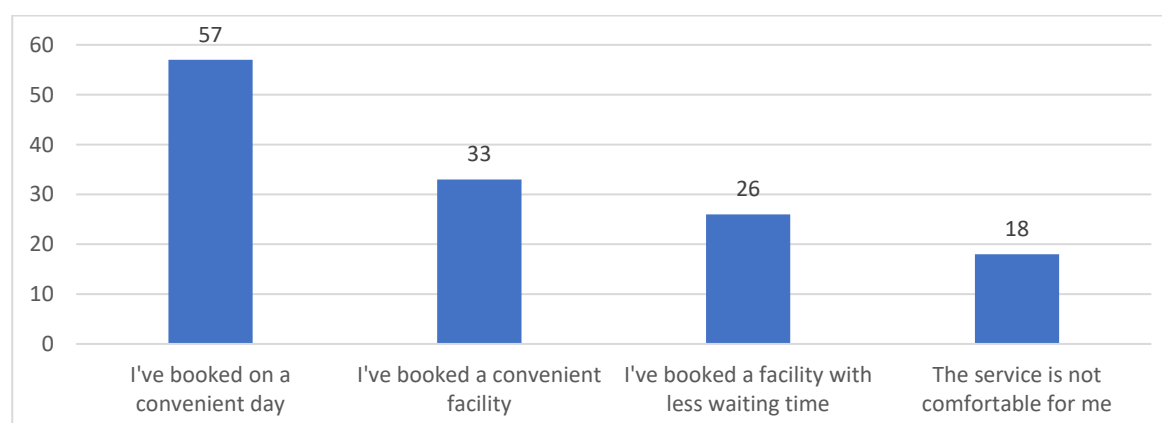


Source: CAWI IZI 2023 survey

Access to the service was mostly through the web portal (62%), but other channels were also significant, such as the SovraCUP App (19%), the general practitioner (18%), the pharmacy (13%).

Users who have used SovraCUP express a high degree of satisfaction with the service. Overall, 72% of users considered the service useful; It should be noted, in particular, that the highest figure belongs to those under 34. 57% booked a service on a day chosen based on convenience and 33% in a structure convenient from the point of view of territorial location. It is very relevant to observe in the following figure that 26% say they were able to book in a facility with the shortest waiting times. This encourages us to hypothesize that the SovraCUP could be a tool to address the problem, currently at the center of attention, of waiting lists, which often actually hinder the exercise of the right to health. Only 18% say the service is of little use for their personal needs.

Fig. 40 – Opinion on the usefulness of the SovraCUP service (%)



Source: CAWI IZI 2023 survey

In addition to the waiting time, 52% of users say they saved a lot of time making the reservation. A limited but significant number of users (13%) express doubts about the guarantee of privacy. Likewise, 15% of users encountered problems that effectively prevented access to the service.

The SovraCUP was particularly appreciated by those interviewed. As previously mentioned, the general satisfaction with the service was notable and the perception of time savings was widespread. Furthermore, the open responses regarding service improvement highlight the request for greater efficiency, improvements to the site and the availability of appointments. Finally, 77% believe that the digital innovation services of the Public Administration are useful for citizens and, in particular, the SovraCUP was rated 3.7 on a score scale from 1 to 5.

For any further information on the survey, please refer to the specific Report in Appendix 2.

5.4 Strengthening local public telematic services, digitalisation of administrative processes and interoperability of public databases

Within Action 2.2.1, the role of territorialized projects was also significant, which contributed to the strengthening of local public telematic services and the improvement of the administrative capacity of the PA through the diffusion of new technologies and the quality of telematic services, through projects that concerned urban areas, internal areas and participatory local development strategies (CLLD - Community-Led Local Development).

Among these there are several municipal projects for the digitalisation of inter-administrative collaboration processes and which have allowed the diffusion of digital services for citizens and businesses (e.g. digital portal-desk for citizens), the digitalisation of building practices, the digitalisation of historical documents of municipalities, the digitization of libraries.

In the Sicilian Region, as part of Action 2.2.3 of the ERDF OP, the Open data Sicily project was created, aimed at the dissemination of fully interoperable digital services of the PA, thanks to which interoperability tools were tested with the Bank of Italy and between the management information systems of the Region, such as for example between the Caronte monitoring system and the Accounting Information System of the Region (SIC).

Stakeholder testimonials

With Open data, interoperability tools were tested with the Bank of Italy and between our management IT systems. For example, we promoted interoperability between different funds (e.g. ESF/ERDF) and we created an interoperability project between the Caronte monitoring system and the Accounting Information System (SIC), so that there was a transfer between the accounting information (invoices, payments and mandates) directly with Caronte monitoring.

Charon. What is that²⁶

Caronte is the integrated information system for the collection, management and transmission of information relating to investment projects financed mainly under the Structural Funds and the Development and Cohesion Fund - FSC (ex FAS) of the Sicilian Region.

This system is conceived as a single project manager and tool for monitoring public investments financed with European, national and/or regional resources.

Through a suitable application cooperation interface, Caronte communicates with the internal Management and Financial Control Information System (SIC) managed by the Regional Budget Department, drawing information of interest for monitoring interventions.

²⁶ https://caronte.regione.sicilia.it/cms/pagemenus/46?pagemenu_id=1.

The system also works in synergy with the portal, from where it is possible to access the home page and the area reserved for Caronte users. The portal, conceived as an interactive tool, allows users to provide suggestions regarding the use of Caronte by accessing the "Updates" section of the site.

Through the portal it is also possible to access the e-learning platform and the contents relating to the frontal training sessions regarding the use of Caronte.

According to some stakeholders, the interventions of this action had a transversal impact on all the thematic areas of the S3 Strategy.

Stakeholder testimonials

The fallout from all these activities, e.g. the intervention that brought a large part of the administration's interventions to the cloud protected everything digital. Since Sicily does not have a data center, Cloud 1 and 2 were created thanks to these interventions; all platforms have been moved to the cloud and all areas benefit from this.

Three-Year Plan for the Digital Transition 21-23. Cloud 1 and 2 projects

In line with the Cloud First principle, clearly stated by the Digital Agenda for Sicily, and with the developments of national strategies, the Sicilian Region has created Cloud 1 and 2 projects for porting applications used by the Administration to the cloud.

The porting concerns 10 applications which will be replaced with new native cloud applications or with already available SaaS, assigning priority to what is available and qualified in the AgID Cloud Marketplace and 77 applications to be migrated to the Cloud. The operation made it possible to discontinue 27 obsolete applications.

Also, within the scope of this action there was a significant contribution from the so-called territorialized projects, which contributed to the strengthening of local public telematic services and to the improvement of the administrative capacity of the PA, raising the quality of local public telematic services. For Action 2.2.3, in fact, the territorialized projects concerned urban areas and internal areas and involved the reorganization of municipal databases and the construction of data platforms. In particular, we can highlight the interventions for the construction of databases in the environmental field and for the mapping of the territory which, through better knowledge, facilitate the processes of governance, protection, development and transformation.

5.5 Critical issues and success factors

As regards Action 2.1.1, the main critical issue was undoubtedly the pandemic which caused an inevitable slowdown in implementation during the years 2020 and 2021. Nonetheless, in the Sicily region the municipalities in which the installations were started and completed of ICT infrastructures for access to broadband and ultra-broadband were greater than those achieved by other regions in the same period.

Stakeholder testimony

Also following the problems caused by the pandemic, the project slowed down during the two years 2020-2021, even though compared to other regions we have a percentage of municipalities started and completed among the top regions in Italy. We have a percentage of around 70% but other regions perhaps don't even reach 50%. We managed to make good progress.

Another initially encountered difficulty was of an administrative nature, related to the dispute regarding the VAT, which was subsequently resolved last year because the VAT was deemed admissible by the European Court of Justice (judgment dated June 22, 2022). As a result, it can now be accounted for and justified.

Further critical issues of an administrative nature of the intervention concerned in Action 2.1.1 the process of stipulating the agreements between the Municipality, the Region and INFRATEL, mainly due to the mistrust of the municipalities and the procedural timescales, and subsequently the lack of or delayed authorization by the common to Open Fiber to carry out the excavations, due to the lack of ad hoc regulations for ultra-broadband. The lack of or delayed authorization to carry out the works also concerned the excavations necessary to ensure fiber connections between different areas at the provincial level. The fiber inevitably had to cross provincial roads, railways and motorways and therefore the authorization process was particularly complex, as the authorizations had to be issued by numerous different authorities, such as the Consorzio Autostrade Siciliane, the railway network, the basin authorities and others superintendencies and therefore there were delays and critical issues, which were overcome not without difficulty.

Stakeholder testimonials

The first step to start laying fiber in a municipality is the stipulation of the agreement between the Municipality, Region and INFRATEL. INFRATEL sent the agreement to the Region and the Region sent the agreements to be signed to all the mayors, with all the problems.

The agreements were sent to all the municipalities in Sicily and they were interviewed by telephone and email explaining what the agreement envisaged, which essentially involves an agreement between the parties, where it is explained what the project is, what INFRATEL intended to do. The agreement had to be signed by the mayor and sent back to the Region; the Region signed it and it was sent to INFRATEL for signature. Thus, the convention was operational.

The first obstacle is that out of 380 municipalities at least 50% of the mayors did not want to sign the agreement for various reasons either because they did not know what they were talking about or because they were terrified that unplanned work could be carried out in the municipality or for other reasons.

The Sicily Region had to work for a year to get 150-180 agreements signed. The councilor had to make memos and repeatedly forward notes to the municipalities signed by him and the general manager. In essence, the mayors were ordered to sign, explaining that the ultra-broadband project was a strategic project and therefore by not signing the agreement they were not adhering to this European strategy. In the end, with this work of persuasion and pressure, the Region managed to get 340-350 agreements signed with the municipalities of Sicily.

Once the agreement was signed, INFRATEL formulated the executive project which, once approved, allowed Open Fiber to begin operations. Here a second problem arose, as many municipalities did not give authorization to Open Fiber to carry out the excavation, because at the beginning of the works there were no ad hoc regulations for ultra-broadband, for which Open Fiber asked the authorizations to the municipalities, which were not issued in half of the municipalities. The Region has persuaded the mayors and the technical offices of the municipalities to grant the authorizations.

Over the years there have been various regulations, a 2020 regulation stipulated that Open Fiber did not even have to ask for any authorization, that is, silent consent was guaranteed, but despite this the municipalities persisted in not authorizing. Open Fiber therefore turned to the Region to represent the problems and these problems have been overcome over the course of these two years.

In addition to the municipalities, the problem that arose in the lack of authorizations also concerned the CAS - Consorzio Autostrade Siciliane and the railway network and for the basin authorities, because in addition to the fiber that is laid in the municipalities, the fiber clearly must then be connected at a provincial level, through hubs, and therefore the fiber from the municipalities must go to other areas and must cross provincial roads, railways, motorways, managed by basin authorities

and superintendencies and therefore the situation has become even more complicated. Many of these problems, with much pressure from the Sicily Region, have been overcome and few critical issues remain.

As regards Action 2.2.1, only in two cases out of 10 were the planned activities completely implemented. In particular, the main critical issues encountered in Action 2.2.1, as well as in Action 2.2.3, concerned the highly innovative nature of the actions. The objective of digitizing administrative processes has, in fact, clashed with Sicily's long-standing problem of the modest presence of qualified personnel responsible for managing digital services in the local regional public administration. Furthermore, the digitalisation of administrative processes involves a profound revolution in the operating methods and skills necessary to deal with them.

Stakeholder testimonials

There was no IT engineer in place within the Sicilian Region. Therefore, we relied on the IT skills of self-taught people or engineers who were not in the role. After the competition held in 2022, there are now 8 management officials with the role of computer engineers. Consider then that the average age of the Sicilian Region is around 60 years and there are problems with the presence of personnel.

In general, regarding the obstacles to the digitalisation of administrative processes, it must be said that certain projects through digitalisation undermine the status quo and the operational way that the administration has to function. That is, they lead public administration to native digitalization (e.g. avoiding printing or scanning). It is a great revolution that has arrived in the regional administration, which has an elephantine structure.

Furthermore, other critical issues reported by stakeholders were those relating to the reference context, such as cultural weakness, unforeseen events and phenomena, new needs, and obviously the effects generated by the Covid pandemic.

Finally, among the critical issues encountered, the beneficiaries reported the selection procedures of the implementing body, which had to be redone due to the entry into force of the new contract code, adapting these procedures and the tender documents to the new legislation.

A further critical element concerns the delay (2nd semester 2022) with which the operations aimed at the university of both actions were financed, in particular 8 projects of Action 2.2.1 and 4 of Action 2.2.3.

Overcoming these critical issues was made possible by leveraging some facilitation or success factors.

As regards Action 2.1.1, the main success factor was represented by the agency and the problem-solving role played by the Sicilian Region itself for overcoming the various technical and administrative problems encountered, which Open Fiber alone did not could have solved it.

In the context of Action 2.2.1, the main success factors that positively influenced the implementation of the activities were, instead, the reference context and the environment favorable to the implementation of the project (6 cases out of 10) and the quality of the project working group, from the point of view of knowledge, skills and competences (5 cases out of 10), with particular reference to management capacity and planning capacity (3 cases out of 10), also functional in using all available financial resources beyond regional ones.

Stakeholder testimonials

Due to the small number in my office, the quality of the working group is fundamental and knowledge related to the various extra-regional financing plans, knowledge of the implementation manuals was necessary. In short, since we are few, we must be able to guarantee compliance with procedures and deadlines. They facilitate the types of intervention previously successfully tested, such as procurement methodologies (e.g. framework agreement, Consip, other types of procurement). It is important to also be a point of reference for the university or bodies we finance.

The use of financial resources in addition to regional ones is fundamental. The problem is not resources, Sicily's problem is planning and financing resources. That is, the real problem is precisely that of being able to design and not so much to use.

According to the stakeholders, further success factors were also the training of the staff responsible for managing digital services (which made it possible not to block the project and indeed to accompany it in its management and management phase even before testing), the quality of the intervention partnership (such as, for example, the healthcare companies that are partners of the SovraCup project, each of which contributed to the success of the intervention despite the differences in suppliers, applications and interests), the activation of intervention networks (Networking) and the carrying out of information, publicity and awareness initiatives (for example, regarding the use of the app in the SovraCup project), guaranteeing the quality of the information (for example, through the dissemination of effective informative videos with tutorials intended for citizens and operators) and support and accompaniment to the recipients of the interventions.

5.6 The contribution of the considered actions of the Thematic Objective OT2 to the regional strategy for smart specialization (S3)

This chapter presents a summary of the contribution to the achievement of the general objectives of the Regional Strategy for Smart Specialization (S3) provided by the results and effects achieved thanks to the implementation of the interventions financed within the scope of the actions considered of the specific OS2 Objectives. 1 and OS2.2 relating to the Thematic Objective OT2 of the OP ERDF Sicily 2014-2020.

The context of the 2014-20 programming

The Sicilian S3 Strategy for the period 2014-2020 envisaged as a second general objective that of supporting the diffusion of innovative solutions and services in response to unsatisfied social, economic and environmental needs and aimed at improving the quality of life of Sicilians.

In this perspective, this second objective was aimed at increasing and increasing the diffusion of innovative services and solutions aimed at promoting the raising of the quality of life.

In this sense, the Digital Agenda played a strategic role for intelligent, sustainable and inclusive development of the region: in fact, ICTs are included among the KETs capable of achieving effective technological diversification with positive repercussions on growth, representing the "support technological" prevalent in the various thematic areas of intelligent specialization (Smart Cities and Communities, social innovation, tourism, culture and cultural heritage, energy, etc.).

At the same time, the overall vision of the Strategy gave the development of ICT a fundamental role in allowing access to social, citizenship and market services, capable of guaranteeing better living conditions for citizens (with particular reference to disadvantaged categories and areas disadvantaged) and better contextual conditions for business activities.

The OT2 of the ERDF OP and the S3

In order to provide a contribution to the achievement of General Objective 2 of the S3 Strategy (supporting the diffusion of innovative solutions and services in response to unsatisfied social, economic and environmental needs and aimed at improving the quality of life of Sicilians), the Sicilian Region promoted, as mentioned, the implementation of Actions 2.1.1a and 2.1.1b functional to the reduction of digital divides in the territories and diffusion of ultra-broadband connectivity ("European Digital Agenda") and Actions 2.2.1 and 2.2.3 for the digitalisation of administrative processes and dissemination of fully interoperable digital services, as well as other interventions not subject to this evaluation.

In particular, the OP ERDF Sicily 2014 - 2020 contributed to the reduction of digital gaps in the territories consistently with the objectives set for 2020 by the European "Digital Agenda" and above all to the achievement of the aforementioned second objective of the S3 Strategy, through the installation of infrastructures ICT for access to broadband and ultra-broadband in productive areas and in less densely populated rural and inland areas.

Even if the impact of complete reduction of digital divides in the territories cannot yet be said to have been achieved, due to the implementation delays and difficulties encountered, previously mentioned, this intervention has provided an indisputable contribution to enrichment for the population of the Region by increasing connectivity digital, with a potential impact on all the thematic areas of the S3 Strategy, obviously starting from the one called Smart cities.

The increased digital connectivity obtained thanks to the ERDF OP constitutes a great opportunity for the strategic development of Sicily, its entrepreneurial fabric, its public administrations, and its citizens, and lays the foundations for triggering inclusive, intelligent and sustainable growth. This is an opportunity which has taken on new characteristics as a result of the transformations induced by the COVID-19 pandemic which has shown even more the importance of reducing digital divides in all areas of the country to guarantee the continuity and development of activities economic and social.

Furthermore, the implementation of the OP ERDF Sicily 2014-20 contributed to the achievement of one of the objectives of the S3 Strategy, namely that of the diffusion of innovative solutions and services, aimed at improving the quality of life of Sicilians, especially in universities, in health services and in the Sicilian Region.

As seen, thanks to the implementation of the projects financed under Action 2.2.1, an effective diffusion of digital services for university students was achieved, both through document management platforms (e.g. University of Catania and University of Palermo), which through educational innovation interventions through virtual assistance, specific classrooms for virtual reality and reality experimentation, apps and digital platforms, digital environments for teaching, research and the third mission (e.g. University of Messina) .

Furthermore, thanks to the implementation of the SovraCUP project, dedicated to the booking of specialist visits and diagnostic tests in the Health Authorities of the Sicilian Region, an effective improvement in access to health services for citizens was achieved, effectively contributing, also in this case , to achieve Objective 2 of the S3 Strategy to improve the quality of life of Sicilians, through a service capable of concretely addressing the issue of accessibility of services (choice of location and dates of services and health services) and, above all the question of waiting times.

The Sicilian Region is also thinking of further spreading this system of innovative digital services, through the activation of booking totems located in different corners of the city and this would certainly respond to the objective of the Smart city evoked by the S3 strategy.

Finally, the strengthening of local public telematic services obtained thanks to the implementation of territorialized projects for the digitalisation of service processes for citizens and businesses (e.g. digital desks for citizens, digital services for building practices, etc.), has had a transversal impact with respect to all the thematic areas of the S3 Strategy.

Towards S3 Sicily 2021-2027

In continuity with the impacts presented above of the 2014-20 ERDF OP and in light of the increasingly relevant implications that digitalisation has taken on over the last few years, also due to the effects generated by the COVID-19 pandemic, the S3 Sicily for the period 2021-2027 identifies among the challenges to be faced that of strengthening the digitalisation of the entire regional community.

In particular, the Strategy highlights that:

- the digital transition constitutes a great opportunity for the strategic projection of Sicily, its entrepreneurial fabric, its public administrations, and its citizens, to trigger inclusive, intelligent and sustainable growth;

- digital connectivity in the time of COVID-19 has become a fundamental tool for individuals, governments and businesses to ensure the continuity of economic and social activities despite social distancing and partial blocking of production;
- the implementation of interventions aimed at guaranteeing the fundamental right to digital inclusion of Sicilian families and businesses is essential;
- a "digital PA" becomes an enabling condition for transformation processes, facilitating change in a structural way and creating favorable conditions for innovation to be generated.

PART THREE - CONCLUSIONS AND POLICY INDICATIONS

This final chapter presents a summary of the results and impacts of the Operational Program (OP) of the Sicilian Region ERDF 2014-2020 and its contribution to the achievement of the general and specific objectives identified by the regional strategy for smart specialization (S3).

The evaluation conclusions, organized below for each thematic objective and specific objective of the ERDF OP, summarize the main results and impacts achieved, giving account, as far as possible, of the subjects involved and the causes of the factors that generated or favored them or conditioned or hindered.

In relation to each conclusion, synthetic policy indications are provided which, considering the approach of the end of this programming cycle, essentially aim to suggest useful indications and ideas for the programming of the ERDF Sicily 2021-2027, rather than providing useful indications for improving the effectiveness of the ERDF OP 2014-20.

In particular, the indications proposed by the Evaluator concern:

- the opportunity and methods of re-proposing actions and interventions that have contributed to the achievement of the general and specific objectives identified by the Regional Strategy for Smart Specialization (S3);
- the increase in interventions aimed at strengthening and developing relationships and cooperation between businesses and the world of research;
- the valorisation, capitalization and dissemination of the results obtained from the OP, also in light of the lessons learned by beneficiaries, stakeholders and AcAdG to deal with the pandemic situation;
- the need to concentrate the 2021-2027 programming on interventions aimed at addressing the elements of weakness encountered, made even more evident by the pandemic context, such as the need to combat the phenomenon of the digital divide, investing in awareness-raising and strengthening actions of IT skills both towards company representatives and PA operators.

1. Axis 1: Results, impacts and strategic indications

In order to provide a contribution to achieving the general and specific Objectives of the S3 Strategy, in reference to thematic Objective 1 aimed at strengthening research, technological development and innovation, the Sicilian Region has promoted the implementation of Actions 1.1.2, 1.1.3 and 1.1.5, as well as other interventions not covered by this evaluation.

In particular, the OP ERDF Sicily 2014 - 2020 contributed to strengthening the competitiveness of the regional production system by supporting the diffusion of innovation of innovative solutions and services in response to unsatisfied social, economic and environmental needs in the six thematic areas of the S3 (Agri-food , Marine Economy, Energy, Smart Cities & Communities, Life Sciences, Tourism, Cultural Heritage and Culture), consistently with the provisions of the Guidelines on the Smart Specialization Strategy (S3) developed by the European Commission.

Below is a summary of the evaluation conclusions together with specific useful indications for planning new interventions in the ERDF 2021-27.

THEMATIC OBJECTIVE 1. STRENGTHEN RESEARCH, TECHNOLOGICAL DEVELOPMENT AND INNOVATION

Specific objective 1.1 - Increase in innovation activity of companies

Conclusion 1

Action 1.1.5 carried out to pursue the specific Objective 1.1 contributed significantly to the achievement of the general objectives 1 (strengthen the orientation towards innovation of the regional production system), 2 (diffusion of innovative solutions and services) and 3 (diffusion of the culture of innovation) of the S3 Strategy²⁷, first of all favoring effects of technological innovation due to the adoption of highly innovative prototypes and the application of new key enabling technologies (KETs), with particular reference to information and communication technologies (e.g. web application of technologies integrated in the cloud, IT technologies and artificial intelligence algorithms, etc.), advanced materials (e.g. hybrid bimetallic and metal-composite systems, low friction coatings, etc.), nanotechnology, micro- and nanoelectronics and biotechnologies (e.g. applied to human health).

Furthermore, through the implementation of Action 1.1.5 a technological improvement was achieved at the level of products and processes, thanks to the experimentation of new applications and new technological protocols and production processes which are also innovative (e.g. higher quality of food products obtained together with the limited use of important natural resources; management platforms and IT systems functional to research and exchange of information).

A further relevant effect for the purposes of contributing to the aforementioned objectives of the S3 Strategy was the strengthening of the knowledge and skills of companies (for example, in the field of nanomaterials and applied sensing with possible future developments on new projects or in the mastery of new KETs).

These effects were generated despite a series of critical factors mainly linked to the problems generated by the Covid-19 pandemic and the economic crisis resulting from the Russian-Ukrainian conflict which negatively

²⁷ General objective 2 - Support the diffusion of innovative solutions and services in response to unsatisfied social, economic and environmental needs and aimed at improving the quality of life of Sicilians); General objective 3 - Promote the widest diffusion of the culture of innovation at all levels of regional society).

influenced the possibility of achieving the expected results, slowing down the implementation process or reducing the potential positive effects. In addition to these exogenous critical issues linked to the context, secondary critical factors have been recorded relating to management and administrative difficulties of the projects (relating, for example, to the IT reporting procedures, to the functionality of the Caronte monitoring platform, to the remodulation, etc.) and financial criticalities (e.g. delays in the disbursement of financing), which also slowed down the achievement of the expected effects.

On the other hand, overcoming the highlighted obstacles and achieving the important innovation effects of the companies was possible thanks to a series of success factors crucial to the success of the projects such as the quality of the project working group (with particular reference to leadership and the set of knowledge and skills available) and above all the quality of the partnership, in terms of skills and competences, which made it possible to cope with the aforementioned difficulties and unexpected project events, through synergistic and effective collaboration.

More generally, the effects of Action 1.1.5 were favored by the strengthening of partnerships and the development of collaboration networks between the world of research and businesses, as a determining factor of impact and sustainability to promote innovation, develop a set of necessary skills and also innovate industrial products and processes in all areas of the S3 Strategy.

Indication 1.1

It is suggested to propose the interventions carried out again in the 2021-2027 programming, in consideration of the relevant and significant contribution they can provide to promote the technological advancement of companies. In particular, it is recommended to strengthen the use of simplified cost options, considering the possibility to apply them to relevant expense items (such as personnel), which can significantly contribute to reducing administrative burdens for both beneficiaries and administration and facilitate project completion times. It is also essential to support the creation of networks of entities operating in the sector, in order to generate synergistic effects that can stimulate and facilitate the development of innovative practices.

Indication 1.2

Develop and support collaboration between university and industry, through the inclusion of reward criteria in tenders, seeking procedural solutions to overcome the critical issues encountered, linked to the different timescales of research and industry, which are not always easy to reconcile, even in consideration of the aforementioned significant effects of this collaboration, which proved decisive for developing the necessary skills and for innovating industrial products and processes, for example in the context of the maritime economy of the S3 Strategy.

Indication 1.3

Facilitate synergy and complementarity between the different sources of financing, constructing tenders that take into consideration the possibilities offered by the other Programs (directly or indirectly managed) on the different areas of the S3, in order to maximize the effects generated by the ERDF. In particular, it is possible to define calls for tenders which, enhancing the complementarity between European and national funds, provide for system actions with interventions and resources made available not only by the ERDF but also by other national and regional programmes.

Conclusion 2

Action 1.1.2 also contributed significantly to the achievement of the objectives of the S3 Strategy thanks to the effects of technological innovation of companies (e.g. application of new technologies, digital innovation, development of digital and management IT systems such as apps, devices, dashboard, energy efficiency actions, interventions to improve products from an environmental or qualitative point of view, etc.), obtained on the basis of the support provided to companies through the catalog offer of advanced, knowledge-intensive services and made possible above all by quality of the project working group and partnership (in terms of knowledge, skills, leadership, etc.).

This support has also favored important effects of development and commercial improvement of the companies involved (e.g. corporate visibility, reaching customers and development in terms of turnover, improvement of operational marketing strategies, etc.), as well as the improvement of technical, organizational and of the business organization (improvement of work organization, business management, business processes, supply chain, etc.).

Indication 2.1

Continue, giving continuity to what has already been achieved in the 2014-2020 ERDF, in the planning in the 21-27 period of support interventions for businesses for the purchase of Knowledge Intensive Business services, given the significant contribution they have demonstrated they can provide to technological innovation, organizational innovation and commercial innovation of Sicilian companies. In analogy with what was suggested for Action 1.1.5, we highlight the importance of providing reward criteria in the tenders that can further encourage the creation of stable networks between regional research subjects, also with a view to facilitating the sustainability of the funded projects.

Indication 2.2

Use consultancy support, such as that provided for in Action 1.1.2 of the ERDF OP 14-20, in a preparatory manner for the participation of companies (Micro and SMEs) in broader actions (such as Action 1.1.5 - technological advancement - and, subsequently, Action 1.1.3 – economic valorisation of innovation). Consultants can in fact provide, especially to micro and small businesses, an important contribution to projecting themselves into a wider panorama of opportunities and relationships, including with the world of research. From this perspective, it appears useful to consider in detail the effectiveness, efficiency and relevance of the offer of the consultancy catalog accessible by beneficiaries.

Indication 2.3

Focus on the valorisation of research mainly through the aforementioned support for the development of research-industry relationships, in the awareness of the importance of transforming the knowledge produced by research into knowledge directly usable for production and technology transfer purposes, as well as the co-evolutionary process between companies and the world of the research that underlies the possibility of promoting technological innovation²⁸. In this sense, the valorisation of research results is only possible if

²⁸ In this regard, it should be remembered that at the end of the 1990s, Leydesdorff and Etzkowitz had proposed the "triple helix" model to describe the new relationships between universities and businesses. The model, in particular, recognizes innovation as a continuous interaction between three different institutional spheres (the "helices"), namely the university, the government and businesses, within which different types of actors act. According to this model, the relationships between these three spheres have changed greatly over time. If, previously, government, businesses and universities operated separately, each following their own strategies, now they act increasingly in harmony, giving shape to co-evolutionary processes, at the intersection of which the research process is activated. In this way, changes that occur within one of the three spheres tend to be transmitted to the others, giving shape to a process of "endless transition", which requires more complex and sophisticated levels of governance. The image of the "triple helix" summarizes this process. More recently, thanks to the contribution of Elias G. Carayannis and David FJ Campbell, the model has been evolved into the so-called "Quadruple Helix". The new approach is based on the systematization of multilateral relations between the institutional spheres of the Triple Helix i.e. University, Government and Industry, to which is added the fourth blade of the helix: the civil-democratic component of the innovation system. The idea is to encourage and implement innovation processes through transversal collaboration and proactive sharing of knowledge and experiences. The additional and innovative

relationships between universities, research centres, businesses and civil society are increased and strengthened, overcoming the rigidity of the rules of engagement and management of funds, also with the aim of facilitate technological transfer and the placing of innovations on the market. This valorization together with the strengthening of relationships constitute an undoubted sustainability factor to make technological innovation possible over time. From this perspective, it appears useful to include in the tenders a strong project component aimed at communicating (also through the use of innovative forms) the results of the project and its potential uses both by professionals and the general public.

Conclusion 3

The contribution of the operations financed under Action 1.1.3 to the increase in the innovation activity of companies was inevitably partial, given that in terms of resources allocated this action was the least supported by the Sicilian Region in the context of OS1.1 due to the reduced participation in the call by companies, probably due to some characteristics of the Notice (maximum amount for the project and co-financing of 50% for SMEs and 15% for large companies), and in consideration of implementation delays, mainly caused by the pandemic, taking into account that most of the projects of Action 1.1.3 were started precisely in conjunction with the period of the health emergency. Nonetheless, this action provided a direct contribution to the S3 Strategy mainly in the areas of Agri-food, Life Sciences, Smart Cities & Communities, Tourism and Culture²⁹, given the noted effects of adopting innovative solutions in processes, which have led to the industrialization of research results. Significant effects were also recorded in terms of product innovation, while the contribution to innovation in organizational formulas was more limited.

Indication 3.1

Invest more within the 21-27 programming in supporting the economic valorisation of business innovation and in financing the industrialization of research results, if we want to achieve a significant increase in companies carrying out R&D activities in collaboration with external parties and, more generally, to the increase in innovation activity of companies. In this regard, it is important to propose again in the 21-27 programming a support similar to what was already foreseen in the Action. However, in light of the modest participation of companies in the tender relating to this Action, which led to a notable reduction in the resources initially assigned to the Action 1.1.3 (the final quota represents 10.8% of the initial quota)³⁰, it is recommended to promote suitable initiatives for information and awareness targeting both large enterprises and SMEs. This is aimed at clarifying the potential benefits for beneficiaries and providing a detailed explanation of the content and characteristics of the notices.

component of the fourth blade, not to be considered only as a mere evolution of the tripartite version, is in fact constituted by the democratic participation of civil society in collaborating in the construction of innovative ecosystems and in orienting the analysis of alternative solutions, constituting the multiplicative factor the impact of innovation policies on society. See Etzkowitz H., Leydesdorff L. (eds), *Universities in the Global Economy: A Triple Helix of University-Industry-Government Relations*, Cassel Academic, London, 1997; Etzkowitz H., *The evolution of the entrepreneurial university*, in "International Journal of Technology and Globalisation", vol. 1, No. 1, 2004; Carayannis EG, Campbell DFJ, *Mode 3' and 'Quadruple Helix': Toward a 21st century fractal innovation ecosystem*, January 2009, International Journal of Technology Management.

²⁹ In Action 1.1.3 no projects relating to the Sea Economy area of S3 were financed and only one project was financed for the Energy sector.

³⁰ As previously highlighted, the allocation for Action 1.1.3 increased from 56,062,268.80 to 6,056,211.00 euros. The movement of resources was carried out for the benefit of Action 1.1.5.

Conclusion 4

Through the actions financed under OS 1.1 there has been a significant increase in the number of companies that have joined regional initiatives to support innovation. Through partnership activities, where applicable, or the support of specialist consultancy, these companies have become part of the regional innovation fabric.

Indication 4.1

Continue to support the involvement of businesses in regional innovation support initiatives. This policy finds its justification in the fact that the S3 2014-20 Strategy had already highlighted as a strong point the significant participation of companies in regional innovation support initiatives. Furthermore, the significant increase obtained thanks to the 2014-20 ERDF OP makes the confirmation of this policy as part of the S3 Strategy update in 2021-27 even more promising. In this sense, it is necessary to introduce methods that facilitate the participation of even smaller or less structured entities (e.g. guidelines, regional helpdesk, ad hoc reward criteria, etc.).

Conclusion 5

Action 1.1.5 contributed significantly to the development and consolidation of networks between companies, universities and research institutions, confirming the fundamental role played by partnerships for the success of the S3 Strategy. In particular, the element of stability of partnerships was found to be a factor of continuity, sustainability and strengthening of innovation. In this context, both the customary relationships between companies and university departments and, in particular, the role played by Sicilian universities, and more generally by research centres, in the implementation of innovation activities were found to be fundamental. This collaboration between businesses and universities has effectively led to dynamics of exchange and contamination which has led to mutual benefits, as well as the extension of the network of relationships in some cases even beyond regional borders.

Indication 5.1

It is suggested to focus on the quality of the partnerships, that is to say on partnerships whose participating subjects are characterized by technical and scientific skills, management skills and coordination and leadership skills of the leader, inserting among the evaluation criteria of the composition of the partnership network, the presence and documentation of these requirements in reference to the specific production and technological areas relating to the S3 Strategy envisaged by the Notice. At the same time, it is suggested to include a reward criterion to encourage the re-proposal of partnerships that have demonstrated in previous programming such skills and abilities in the management and implementation of projects due to the results and effects achieved. In fact, it was highlighted how continuity with projects already carried out in the past and the continuation of already tested collaborations between partners certainly influences the achievement of objectives and constitutes a factor in the sustainability of interventions and in strengthening innovation.

Indication 5.2

It is recommended to support the expansion of the involvement of businesses, universities and research institutions in all areas of the S3 strategy, even beyond regional borders. Such cooperation is, in fact, fundamental for promoting innovation and brings benefits both in the world of research and business. As we have seen, these collaborations were, in the context of Action 1.1.5, often not only of a regional but also extra-regional nature, especially in the fields of Energy, Smart Cities, Tourism and Cultural Heritage and Life Sciences. In this regard, reward criteria could be envisaged for non-regional entities by requiring the availability of an operational headquarters in Sicily.

Indication 5.3

It is suggested to launch initiatives to capitalize on the results of the OP and disseminate those collaboration models and practices that have proven to be most effective, through the organization of work and exchange opportunities between groups of interested stakeholders (representatives of , universities and research centres) on specific topics.

Indication 5.4

While taking into account the necessary confidentiality needs, it aims to strengthen the mechanism of comparison and exchange between partnerships, requesting and encouraging moments of sharing (e.g. Open Innovation days) of the results and lessons learned relating to the actions to be undertaken, to the implementation methods, the management of risk factors and the valorisation of success factors, for the creation of an environment conducive to innovation and ensuring its sustainability.

Conclusion 6

The pandemic, in its various phases but above all in the initial one (unexpected and sudden from all points of view), is the factor that most (and inevitably) influenced the implementation of OS1.1 in 2020 with effects that have reverberated in 2021 and in some cases also in subsequent years. The international effects of the health emergency aggravated by the subsequent economic crisis resulting from the Russian-Ukrainian conflict have severely tested the possibility of carrying out what was planned, slowing down the implementation of activities, especially in the medical, healthcare, agri-food and tourism fields, but also of the economy of the sea and of Smart Cities, with inevitable delays in the procurement and supply of raw materials and IT equipment and electronic components, and the consequent increase in costs. The effects of the health emergency and the Russian-Ukrainian conflict have led small companies to the brink of deep crises and large companies to cancel or postpone projects involving innovative activities. However, these emergency situations have also highlighted the ability of the majority of projects (and beneficiaries) to adapt to the new context and to find solutions compatible with the emergency situation (and its constraints and restrictions) in order to redesign, even in perspective, the activities to continue their implementation (especially in the second half of the year).

Indication 6.1

Build, with the collaboration of the beneficiaries and for the different areas of intervention of the projects, one or more repertoires of the solutions adopted and tested in emergency situations which have proven functional to the implementation of interventions for technological, strategic, organizational and commercial innovation of businesses and for the provision of support services to the businesses themselves. In fact, these solutions can be proposed again outside the pandemic emergency, as part of the implementation of the interviews foreseen in the 2021-27 programming.

Indication 6.2

Ensure flexibility in the management of interventions, on the basis of what emerged with the pandemic, especially in relation to the use of financial resources and the possibility of moving their destinations within the project and remodulating the projects by adapting them to the new needs emerging from the context local. The elements of flexibility tested in the 14-20 programming could appropriately be adopted in the 21-27 programming. In this sense, it could be useful to activate living labs among the main stakeholders aimed at ensuring the adoption of the best implementation measures during the Programme.

Conclusion 7

The evaluation made it possible to identify how the complexity and slowness of the bureaucratic, financial and administrative procedures slowed down the implementation of the interventions and the achievement of the planned results. We are referring, in particular, to the times for the publication of the notices, the delays in defining the ranking of the financed projects and in the disbursement of the financing (advances and subsequent payments) which have obviously caused problems, in a period in which companies are they clashed with the issue of liquidity, the excessively long timescales to obtain authorization for the requested project remodulation, the IT reporting procedures, up to the difficulty of feeding the Caronte monitoring system. The latter has seen progressive modifications over the course of the programming and has caused numerous problems in its use by the beneficiaries, although it nevertheless constitutes a tool, although improvable, necessary and useful, which has produced a great change compared to the previous programming.

Indication 7.1

Promote a review and simplification of bureaucratic, financial and administrative procedures, through the involvement of both the operators of the Region and the representatives of companies, universities and research centers, in order to collect the needs and identify possible solutions and process standards and of outcome, with particular attention to timing. The use of simplified cost options can be a relevant operational modality in order to reduce the administrative burdens of the parties involved. Considering the high complexity of the procedures managed by the regional structure and the number of tasks developed by the high number of projects, it is also appropriate to contemplate the possibility of strengthening the competent service, in terms of human resources with specific profiles and possibly software tools that can facilitate the work.

Indication 7.2

Streamline the design and program remodulation process, in order to establish, right from the publication of the tender notices, acceptance conditions, simplified procedures and adequate timescales, capable of ensuring the reprogramming and changes necessary to achieve the expected results, in case of actual needs linked to external factors not dependent on one's ability or will, guaranteeing the necessary flexibility to change direction if the envisaged path no longer proves practicable.

Indication 7.3

It is suggested to request in the tenders the availability of monitoring and administrative management experts from the beneficiaries and at the same time promote training interventions, capacity building and exchange of experiences in the field of monitoring and evaluation, in order to share principles between regional operators and beneficiaries. , procedures, quality criteria, methods of defining and determining the indicators and their expected values, data collection tools and monitoring data processing and reporting systems, functional to both the beneficiaries and the ERDF managing authority.

2. Axis 2: Results, impacts and strategic indications

In order to provide a contribution to the achievement of General Objective 2 of the S3 Strategy (supporting the diffusion of innovative solutions and services in response to unsatisfied social, economic and environmental needs and aimed at improving the quality of life of Sicilians), the Sicilian Region promoted the implementation of Actions 2.1.1a and 2.1.1b functional to the reduction of digital divides in the territories and diffusion of ultra-broadband connectivity ("European Digital Agenda") and Actions 2.2.1 and 2.2.3 for the digitalization of administrative processes and dissemination of fully interoperable digital services, as well as other interventions not covered by this evaluation.

Below is a summary of the evaluation conclusions together with specific useful indications for planning new interventions in the ERDF 2021-27.

THEMATIC OBJECTIVE 2. IMPROVE ACCESS TO INFORMATION AND COMMUNICATION TECHNOLOGIES AS WELL AS COMMITMENT AND QUALITY THEREOF

Specific objective 2.1 - Reduction of digital divides in territories and diffusion of ultra-broadband connectivity ("European Digital Agenda")

Conclusion 8

Action 2.1.1 of the OP ERDF 2014-20 has undoubtedly favored the reduction of digital gaps in the territories, through the installation of ICT infrastructures for access to broadband and ultra-broadband in productive areas and in rural and internal areas less densely populated. Even if due to the implementation delays and difficulties encountered, previously mentioned, it was not possible to complete the number of installations planned for broadband access at at least 30 Mbps, the action nevertheless provided an indisputable contribution of enrichment for the Sicilian population, contributing to the achievement of the objectives set for 2020 by the European "Digital Agenda" and above all to the second objective of the S3 Strategy, namely that of the diffusion of innovative services aimed at improving the quality of life of Sicilians, with a potential impact on all the thematic areas of the S3 Strategy, obviously starting from the one called Smart cities.

Indication 8.1

Complete and consolidate the infrastructure installation work Telecommunications ICT for access to broadband and ultra-broadband, in order to further increase the number of real estate units and consequently of families and businesses that can have access to broadband at at least 30 Mbps.

Indication 8.2

Promote an awareness and information action towards citizens and businesses, especially located in production areas and in less densely populated rural and internal areas, to encourage the effective use of broadband and ultra-broadband, also by clarifying the conditions for exploit all the potential of optical fiber (e.g. availability of devices with network cards commensurate with the new standards, digital capabilities, etc.). This awareness and information action must be conducted through the involvement of the various potential managing bodies of fiber optic connection services, as well as the Open Fiber infrastructure player itself, responsible for the creation of the ultra-broadband (BUL) fiber network infrastructure FTTH (Fiber To The Home) optics which will be able to provide important information on the management and maintenance of the network and its potential for change in the lives of citizens.

Indication 8.3

Provide an awareness and information action also towards municipal administrations, in order to illustrate the advantages of the action for local communities, the regulations to be applied relating to the authorizations to be granted, the methods of overcoming the foreseeable difficulties connected to the characteristics of the territory of the internal areas, as well as in order to provide support for the stipulation of agreements with the managing body.

THEMATIC OBJECTIVE 2. IMPROVE ACCESS TO INFORMATION AND COMMUNICATION TECHNOLOGIES AS WELL AS COMMITMENT AND QUALITY THEREOF

Specific objective 2.2 - Digitalisation of administrative processes and dissemination of fully interoperable digital services

Conclusion 9

Thanks to the implementation of the projects financed under Action 2.2.1, an effective diffusion of digital services has been achieved in the university sector, both through document management platforms (e.g. University of Catania and University of Palermo) and through educational innovation interventions through digital environments, virtual assistance, specific classrooms for virtual reality, apps and digital platforms (e.g. University of Messina). Furthermore, thanks to the implementation of the SovraCUP project, dedicated to the booking of specialist visits and diagnostic tests in the Health Authorities of the Sicilian Region, an effective improvement in access to health services for citizens was achieved, effectively contributing, also in this case, to achieve Objective 2 of the S3 Strategy of improving the quality of life of Sicilians, through a service capable of concretely addressing the issues of accessibility of services and waiting times. Overall, the aforementioned diffusion of digital services has generated an effective reduction in the management times of administrative procedures and an improvement in the quality of local public digital services, especially for citizens and businesses.

Indication 9.1

On the basis of the important results obtained especially in the healthcare and university sectors, further spread the system of innovative digital services, within all local public services of collective interest, through the activation of digital platforms and apps for booking services, digital counters, as well as booking totems, located in different corners of the city, in order to concretely contribute to achieving the Smart city objective of the S3 Strategy.

Indication 9.2

Promote capacity building actions of service personnel in regional and local PA to encourage capacity building regarding the management of digital services for citizens and businesses.

Indication 9.3

Provide for the carrying out of information, publicity and awareness initiatives regarding, for example, the use of the apps or digital platforms created, guaranteeing the quality of the information, through the dissemination of informative videos with tutorials intended for citizens and operators. In particular, it is recommended to organize a specific communication campaign on the SovraCUP service aimed at promoting greater awareness of it and its consequent greater use by Sicilian citizens, given the important results already achieved.

Indication 9.4

Use the knowledge and technologies produced by the projects to improve the environmental and energy sustainability of the services offered by the PA. The reference is, for example, to the systems for rationalizing energy consumption created by the University of Messina as part of the Energy@ME project, which through remote monitoring systems has produced a reduction in energy consumption.

Conclusion 10

The implementation of the interventions financed under Action 2.2.3 of the ERDF OP contributed to the strengthening of local public telematic services and to the improvement of the administrative capacity of the Region and public administrations and had a transversal impact on all thematic areas of the S3 Strategy. This was possible thanks to the implementation of interventions to digitalize administrative processes and promote the interoperability of public databases, through projects such as Open data Sicily, Cloud 1 and 2 and territorialized projects functional to the dematerialization of administrative procedures.

Indication 10.1

Increase the administrative capacity of the Region, through interventions functional to the digitalisation of administrative processes and to ensure the effective interoperability of public databases. In this regard, it is suggested to plan interventions by enhancing complementarity with initiatives and resources of the Administrative Regeneration Plan for Cohesion 2021-2027 (PRigA).

Indication 10.2

Focus on the training of personnel responsible for managing digital services in the regional and local PA, to overcome the long-standing problem in Sicily concerning the modest presence of qualified personnel in the ICT field.

APPENDIX 1- ANALYSIS METHODOLOGY

1. Methodological approach

As specified in the Evaluation Design (Version 1.0 - April 2023), we chose to adopt a multidisciplinary and multi-methodological approach, to respond to the different evaluation needs explained in the technical specifications of the evaluation service of the Sicilian Region ERDF Operational Program 2014- 2020. In particular, in the aforementioned evaluation design, the following main characteristics of this approach were highlighted:

CHARACTERISTIC	RATIONAL
Participated	The evaluator coordinates constantly with the MA and with the other subjects in various capacities involved in the implementation of the Program (including the beneficiaries). In particular, the involvement of stakeholders is envisaged both in the definition of the Evaluation Plan and in the implementation of the evaluation process. Finally, the transfer of the evaluation methodologies to the Administration is ensured in order to allow the application of these methodologies to the interventions implemented within the Program and to encourage, in the future, (self) evaluation activities within the Administration.
Continuous	The evaluation activities will have the priority function of "accompanying" the implementation of the Program for the entire duration of the service by providing an active contribution: to the improvement of the ongoing management activities of the interventions at all decision-making levels involved; to the formulation of proposals for improving the management of the Program and the dissemination of results achieved.
Integrated	The evaluation not only has the objective of measuring and analyzing the results achieved with respect to the set objectives, but will also provide a picture of the results of the Program in the territorial contexts where it is to act.
Propositive	The evaluator provides judgments not of control, but of contribution on the implementation of the Program and on the progressive performances, such as to allow, if necessary, to correct and possibly re-calibrate the implementation decisions of the same in progress.
Multidisciplinary	The evaluation tools, the methodological choices adopted and the professionals employed in the evaluation process will be appropriate and will embrace the different areas/sectors of implementation of the Program (with particular reference to the specific themes being studied in depth).

In this regard, to ensure the required evaluation service, a mixed methods methodology was used, i.e. different theoretical approaches and methods such as:

- **theory-based approach** (oriented towards verifying the effects predicted by the theory of the program and its implementation);
- **realist approach** (characterized by attention to the role of the subjects and the different factors of success and failure);
- **constructivist and participatory approach** (aimed at investigating the process that leads to the results, the role of the various social actors and the study of any unexpected effects);
- finally, for the aforementioned three approaches both qualitative methods were used (functional to clarify the implementation mechanisms, the role of the different actors and the success and failure factors) and a quantitative method (oriented towards verifying the effects that the different actors involved recognize as connected to the intervention carried out).

However, the choice not to use counterfactual experimental methods (in which an attempt is made to associate an effect with a cause) was verified and confirmed, in consideration of the complexity of the Programme, the resources and times available for the evaluation and the intrinsic difficulty, in clarify the causal link between interventions and effects, to exclude the action of other intervening factors that could have caused the outcomes envisaged by the OP.

On the contrary, given the request to verify the results and impacts produced by the OP ERDF Sicilian Region 2014-2020, focusing on investment priorities 1.b (OS.1.1), 2.a (OS2.1) and 2.c (OS2.2), it was decided to focus above all on the adoption of the theory-based evaluation approach, as also required by the technical specifications themselves.

According to this model, in order to truly verify the effectiveness of a program, it is essential to reconstruct the theoretical premises of the Program itself, i.e. the hypotheses of causal link between the inputs and outputs and the expected results on which the Program was founded.

In this framework, it is crucial to distinguish between the “program theory” of policy makers and the “theory of change” of how the program works in practice (Stern 2016)³¹.

The theory of the program is the set of beliefs that underlie the action, i.e. the hypothesis of a causal link between the inputs, outputs and outcomes on which the program was based. In other words, through this theory we specify the chain of causal assumptions that link the resources and activities of a program with its results. The theory of change or "implementation theory" focuses instead on "how the program is conducted, taking into account the characteristics of the subjects involved and the situations linked to the expected outcomes. Program theory is based on the mechanism by which things happen (Stame, 2016)³².

In particular, it is also important to distinguish, within program theory, between program impact theory, «the cause-effect sequences through which the program is expected to produce the changes in the social conditions to which was addressed», and the process theory (program process theory), i.e. the "description of how the program intends to develop interactions with the target population and intends to produce the services envisaged within it" (see Rossi, Freeman, Lipsey, 2004; Palumbo, 2001)³³.

To this end, we tried to reconstruct with the main stakeholders the theoretical assumptions and a shared vision of how change was expected to occur thanks to the implementation of the actions of the ERDF OP 2014-2020.

Below is a graphic representation of the intervention logic of the Operational Program (OP) of the Sicilian Region ERDF 2014-2020, with particular reference to the Thematic Objectives OT1 and OT2 and the related investment priorities 1.b, 2.a and 2.c and the related specific Objectives OS1.1, OS2.1. and OS2.2. In fact, as mentioned, the identification of the logical links underlying the Administration's action constitutes a preparatory and fundamental element for the evaluation of the Programme, as it allows the identification of the different objects to be evaluated (single actions, groups of actions that aim to the same type of impact, individual projects related to actions, etc.) in relation to each evaluation objective.

In the following diagram for each Thematic Objective (TO) and related Investment Priorities and Specific Objectives (OS), the inputs of the Operational Program (actions, resources) are related to the outputs (realizations), the outcomes (specific results) and the impacts (general OT results and expected effects) that are intended to be achieved.

The logical framework was reconstructed by the evaluator, for each TO, based on the contents of the OP and the "Methodological document on indicators (result and output) and performance framework of the OP" (version 14 July 2023), as well as a comparison with the main stakeholders of the Sicilian Region. The inputs consist of the actions envisaged within each SO and the related available financial resources. The achievements were reconstructed based on the description of the actions and related indicators present in the OP, while the expected results and impacts were reconstructed taking into account the result indicators of the OP and the aforementioned methodological document.

³¹ Elliot Stern (2015), *Impact Evaluation. A Guide for Commissioners and Managers*, prepared by Elliot Stern for the Big Lottery Fund, Bond, Comic Relief and the Department for the International Development, May 2015; reprint Franco Angeli, Milan, 2016

³² Nicoletta Stame, *Pluralist Evaluation*, 2016, Franco Angeli, Milan

³³ Peter H. Rossi, Mark W. Lipsey, Howard E. Freeman (2004), *Evaluation: A Systematic Approach*, Sage, London. Palumbo M. (2001) *The evaluation process. Deciding, planning, evaluating*, FrancoAngeli, Milan.

Diagram 1 – Logical framework of the OP**Thematic objective 1. Strengthen research, technological development and innovation**

Investment priority 1.b Promote business investment in R&I by developing links and synergies between businesses, R&D centers and the higher education sector, in particular by promoting investment in product and service development, technology transfer, social innovation, eco-innovation, applications in public services, demand stimulation, networks, clusters and open innovation through smart specialization, as well as supporting technological and applied research, pilot lines, early product validation actions, advanced manufacturing capabilities and first production, especially in key enabling technologies, and the deployment of general purpose technologies, as well as promoting investments needed to strengthen the crisis response capabilities of health services

Specific objective	Actions	Resources	% Resources in OT	Achievements	Specific results	Impact
OS 1.1 - Increase in innovation activity of companies	1.1.2 - Support for the purchase of services for the technological, strategic, organizational and commercial innovation of companies	17,749,527	4.08%	Businesses supported Services for technological, strategic, organizational and commercial innovation created by the supported companies	Increase in companies that have carried out R&D activities in collaboration with external parties	Increase in innovation activity of companies
	1.1.3 – Support for the economic valorisation of innovation through experimentation and the adoption of innovative solutions in processes, products and organizational formulas, as well as through financing the industrialization of research results	6,056,211	1.39%	Businesses supported for the introduction of new products for the company		
	1.1.5- Support for the technological advancement of companies through the financing of pilot lines and early product validation and large-scale demonstration actions.	153.691.511	35.33%	Businesses supported Support for businesses for cooperation with research institutes		

As can be seen from the previous table which reconstructs the intervention logic of the Operational Program (OP) of the ERDF Sicilian Region 2014-2020 relating to Thematic objective 1. "Strengthening research, technological development and innovation", the Sicilian Region intended to achieve the specific result of "Increase in companies that have carried out R&D activities in collaboration with external parties" and the related final impact of "Increase in business innovation activity", focusing mainly on the implementation of business support interventions for cooperation with research institutes as part of Action 1.1.5 to support the

technological advancement of businesses. In fact, in the last remodulation of the OP (July 2023) it was decided to allocate the greatest number of resources (€153,691,511, equal to 35.3% of the resources assigned to the entire TO 1) for projects aimed at promoting the technological advancement of companies, through the development of prototypes and demonstrators, with industrial application of key enabling technologies, especially in the sectors of the S3 regional strategy relating to health, agrifood, energy and environment and technologies for cultural heritage (Cultural Heritage).

Secondly, the Region has always planned in the last remodulation to finance €17,749,527 for the activation of advanced services for the technological, strategic, organizational and commercial innovation of companies (Action 1.1.2). In particular, the Sicilian Region has decided to support companies for the purchase of advanced services offered by qualified suppliers included in a specific catalog (initial support for innovation, support for product and/or process innovation, support for organizational innovation, support for commercial innovation, support for social/environmental innovation, support for specific qualified services). Through the support of these companies for the purchase of the aforementioned services, the Region assumes it can contribute to achieving the specific result of increasing the number of companies carrying out R&D activities in collaboration with external parties, as well as the impact of increasing the innovation of businesses.

Finally, the contribution of the operations financed, under Action 1.1.3, to the increase in companies carrying out R&D activities in collaboration with external parties and to the consequent increase in the innovation activity of companies, appears inevitably partial, given that this action with which it was decided to finance companies for the introduction of new products for the company resulted as the least supported, in terms of resources allocated (€6,056,211) by the Sicilian Region within OS1. 1 (equal to 1.4% of OT1 resources). It should be noted that the resources allocated to this Action were much lower than those estimated at the beginning of the planning (the Action had an identical budget to that of Action 1.1.5), due to the limited interest shown by the companies, which responded to the Notice very limitedly.

Diagram 1 – Logical framework of the OP (continued)**Thematic objective 2. Improve access to information and communication technologies as well as engagement and quality thereof**

Investment priorities 2a - Extend the deployment of broadband and high-speed networks and support the adoption of future and emerging technologies and digital economy networks

Specific objective	Actions	Resources	% Resources in OT	Achievements	Specific results	Impact
OS 2.1 - Reduction of digital divides in territories and diffusion of ultra-broadband connectivity ("European Digital Agenda")	2.1.1 - Contribution to the implementation of the "Digital Agenda Strategic Project for Ultra Broadband" and other planned interventions to ensure connection capacity of at least 30 Mbps in the territories, accelerating its implementation in the production areas, and in the areas rural and internal in compliance with the principle of technological neutrality and in the areas permitted by community legislation	196.979.354	76.50%	Installation of ICT infrastructures for access to broadband at at least 30 Mbps in production areas and less densely populated internal areas	Increase in the population covered with 30 Mbps broadband as a percentage of the resident population Effective use of broadband in productive areas and in internal and rural areas	2.1 Reduction of digital divides in the territories and diffusion of broadband and ultra-broadband connectivity consistently with the objectives set for 2020 by the European "Digital Agenda"
				Installation of ICT infrastructures for access to ultra-broadband at at least 100 Mbps in production areas and less densely populated internal areas	Increase in the population covered with 100 Mbps ultra-broadband as a percentage of the resident population Effective use of broadband and extra-broadband in production areas and in internal and rural areas	

Diagram 1 – Logical framework of the OP (continued)**Thematic objective 2. Improve access to information and communication technologies as well as engagement and quality thereof**

Investment priorities 2c - Strengthen ICT applications for e-government, e-learning, e-inclusion, e-culture and e-health

Specific objective	Actions	Resources	% Resources in OT	Achievements	Specific results	Impact
OS 2.2 - Digitalisation of administrative processes and dissemination of fully interoperable digital services	2.2.1 Technological solutions for the digitalisation and innovation of internal processes of the various areas of Public Administration within the framework of the public connectivity system such as justice (computerisation of civil proceedings), healthcare, tourism, cultural activities and heritage, business services.	34,064,622	13.20%	Interventions for the digitalisation of existing services and administrative procedures for businesses and citizens in the PP.AA. Regional in the fields of health, justice, valorization of cultural heritage	Increase in digitalized administrative services and procedures	2.2 Digitalisation of administrative processes and dissemination of fully interoperable digital PA services offered to citizens and businesses (particularly in healthcare and justice)
	2.2.3- Interventions to ensure the interoperability of public databases. (The interventions primarily include large public databases, possibly also new databases, as well as those created through the associated management of ICT functions, in particular in small municipalities using, where appropriate, cloud solutions).	21,439,360	8.30%	Interventions for the digitalisation of existing services and administrative procedures for businesses and citizens in the PP.AA. Regional in the fields of health, justice, valorization of cultural heritage	Increase in digitalized administrative services and procedures	

As can be seen from the previous diagram which reconstructs the intervention logic of the Operational Program (OP) of the ERDF Sicilian Region 2014-2020 relating to Thematic objective 2. "Improve access to information and communication technologies as well as the commitment and quality of the same", the Sicilian Region has planned with Action 2.1.1 to install, thanks to a programmed financing based on to the last remodulation in July 2023 of €196979354, ICT infrastructures for access to broadband and ultra-broadband in production areas and in less densely populated internal areas. According to the logic of the OP, the implementation of these interventions should lead to obtaining as a specific result an increase in the population covered with broadband and ultra-broadband and its effective use in productive areas and in internal and rural areas. This result should consequently lead to achieving an impact of reducing digital divides in the territories and spreading broadband and ultra-broadband connectivity in line with the objectives set for 2020 by the European "Digital Agenda".

Furthermore, with regard to the digitalisation of administrative processes and the dissemination of fully interoperable digital services of the PA offered to citizens and businesses (in particular in healthcare and justice) (OS 2.2), the Sicilian Region has envisaged two distinct actions: the Action 2.2.1 "Technological solutions for the digitalisation and innovation of internal processes of the various areas of Public Administration" within the framework of the public connectivity system such as justice (computerisation of civil proceedings), healthcare, tourism, activities and goods cultural, business services and Action 2.2.3 "Interventions to ensure the interoperability of public databases". Through these actions with respective financial resources of €34,064,622 and €21,439,360, again based on the latest remodulation of the OP (July 2023), it was planned to carry out interventions for the digitalisation of existing services and administrative procedures for businesses and citizens in the PP.AA. Regional in the fields of health, justice, valorization of cultural heritage. Thanks to the carrying out of these actions, it is believed that it will be possible to achieve the result of increasing digitalized administrative services and procedures and consequently the general impact of the digitalization of administrative processes and services.

The aforementioned theory-based evaluation approach has been integrated with the so-called realistic evaluation approach, functional to trying to understand why, in certain contexts, some mechanisms work and others not, paying particular attention to the role of the subjects and the different success factors and failure. The emphasis in this case is no longer placed "on how the program can produce the expected result, but on what was obtained - whether expected or not - from the combination triggered by the program and context" (Stame, 2016)³⁴. In this regard, it is fundamental to pay attention to the role of subjects for change in a given situation according to a specific mechanism and therefore to the study of endogenous and exogenous factors and the evaluation of expected and unexpected impacts.

Furthermore, we also used the constructivist and participatory approach aimed at understanding the contribution that the various social actors gave to the implementation of the program and the ways in which the program was implemented. In particular, the evaluation focused its attention on the process that leads to the results, also considering the unexpected effects of the Program as relevant

From a methodological point of view, within this constructivist approach, Social Network Analysis was also used, as a useful method for identifying the methods of interaction and collaboration between the various social actors involved, analyzing any mutual influences on behaviour, as well as the role of networks and links between different subjects, often formalized in real strategic partnerships. In this way, it was possible to acquire further elements useful for examining the factors of success and failure, clarifying whether and to what extent the failure or success of the interventions depended on the performance of the networks activated and involved.

Finally, as mentioned, the use of the aforementioned three approaches involved the use of qualitative methods (such as in-depth interviews with stakeholders, interviews with key informants and privileged witnesses) and quantitative methods, such as the CAWI (Computer Aided Web Interview).

In particular, the survey with the beneficiaries made it possible to measure the results obtained and the obstacle factors encountered and facilitation factors experienced and to verify the effects that the beneficiaries'

³⁴ Nicoletta Stame, op. cit., 2016.

representatives recognize as connected to the interventions carried out and the events that occurred during the implementation of the projects themselves, without therefore claiming to precisely define the causal relationships existing between the various phenomena highlighted by the subjects consulted and the actions carried out. In this framework, the evaluation provides an analysis of the "subjective" impact, i.e. of the consensus generated by the projects at the local level and of the satisfaction of the recipients and main stakeholders regarding the activities carried out.

2. Evaluation questions

In light of the reconstruction of the logical framework of the program theory as well as of the phenomena of interest specific to the aforementioned realist and constructivist-participatory approaches, the evaluation questions were verified and integrated which constitute, as already mentioned in the evaluation design, the central element around to which the research activities were structured with the aim of responding to the knowledge needs expressed by the Administration. In particular, the evaluation questions, formalized in the aforementioned design on the basis of what is expressly indicated in the Evaluation Plan of the 2014-2020 cohesion policy of the Sicilian Region PO ERDF³⁵, have been integrated thanks to the identification of the following indicator phenomena subject to the theory-based evaluation, as well as the aforementioned additional evaluation approaches (realist and constructivist-participatory) in reference to the individual Actions and the related specific Objective:

Indicator phenomena Actions

- Realization (A)
- Barriers/Facilitators (B)
- Judgment regarding relevance to the OS (C)
- Practices (D)
- Specific result (E)

OS indicator phenomena

- Achievement of expected result (1)
- Unexpected effects (2)
- OS contribution to the S3 strategy (3)
- Enabling/Disabling Factors (4)

The following diagram represents the evaluation questions already defined in the evaluation design and subsequently integrated and updated on the basis of the aforementioned theory-based approaches and the realist and constructivist-participatory evaluation, in reference to the aforementioned indicator phenomena.

³⁵ Attachment to the OP ERDF Sicilian Region 2014-2020, January 2020 version.

Diagram 2 – Evaluation questions**Thematic objective 1. Strengthen research, technological development and innovation**

Investment priority 1.b Promote business investment in R&I by developing links and synergies between businesses, R&D centers and the higher education sector, in particular by promoting investment in product and service development, technology transfer, social innovation, eco-innovation, applications in public services, demand stimulation, networks, clusters and open innovation through smart specialization, as well as supporting technological and applied research, pilot lines, early product validation actions, advanced manufacturing capabilities and first production, especially in key enabling technologies, and the deployment of general purpose technologies, as well as promoting investments needed to strengthen the crisis response capabilities of health services

Specific objective	Actions	Evaluation questions (DdV)	Integrated and updated assessment questions
OS 1.1 - Increase in innovation activity of companies	1.1.2 - Support for the purchase of services for the technological, strategic, organizational and commercial innovation of companies	To what extent has the OP ERDF Sicily 2014-2020 contributed to supporting the diffusion of innovation? To what extent has the OP ERDF contributed to strengthening the competitiveness of the regional production system by stimulating orientation towards innovation in the six thematic areas of the S3? To what extent has the POR ERDF Sicily 2014-2020 contributed to strengthening the performance of regional industrial research players?	(A1 -2) What are the main activities that have been carried out within this action with the greatest use of resources? Which of the possible ones are the least financed? (A3) What are the factors that have favored (allowed) the increase in the innovation activity of companies? (A4) What are the factors that have hindered the increase in innovation activities of companies? (A5) In what ways did the set of operations carried out within the actions contribute to OS? (A6) What are the most significant experiences? (A7) What is the contribution of the financed operations compared to achieving the objective of increasing the innovation activity of companies? (O1) To what extent has the increase in the innovation activity of companies been achieved? (O2) What is the opinion on the degree of achievement of SO 1.1 Increase in the innovation activity of companies? (O3) To what extent have links, cooperation networks, partnerships and consortia been developed between companies, research and development centers and the higher education sector (universities)? (O4) What are the contributions of the financed operations to the objectives of the S3 strategy? (O5) What are the contributions of the financed operations to the thematic areas of the S3 strategy, in particular with regard to the competitiveness of the production system? (O6) What is the relevance of the contribution of the financed operations with respect to the thematic areas of the S3 strategy? (O7) What are the factors that have favored (allowed) the increase in the innovation activity of companies? (O8) What are the factors that have hindered the increase in the innovation activity of companies? (O9) To what extent and in what ways has the Has the program provided support to the creation of a favorable environment for innovation? (O10) What is your opinion on the effects of promoting new markets for innovation? (O11) Were there any unforeseen effects of the actions/operations carried out? (O12) To what extent were the different methods envisaged for carrying out the actions used? (O13) To what extent were the different methods envisaged used to encourage the increase in the innovation activity of companies?
	1.1.3 – Support for the economic valorisation of innovation through experimentation and the adoption of innovative solutions in processes, products and organizational formulas, as well as through financing the industrialization of research results		
	1.1.5- Support for the technological advancement of companies through the financing of pilot lines and early product validation and large-scale demonstration actions.		

Diagram 2 – Evaluation questions (continued)**Thematic objective 2. Improve access to information and communication technologies as well as engagement and quality thereof**

Investment priorities 2a - Extend the deployment of broadband and high-speed networks and support the adoption of future and emerging technologies and digital economy networks

Specific objective	Actions	DdV evaluation questions	Integrated and updated assessment questions
OS 2.1 - Reduction of digital divides in territories and diffusion of ultra-broadband connectivity ("European Digital Agenda")	2.1.1 - Contribution to the implementation of the "Digital Agenda Strategic Project for Ultra Broadband" and other planned interventions to ensure connection capacity of at least 30 Mbps in the territories, accelerating its implementation in the production areas, and in the areas rural and internal in compliance with the principle of technological neutrality and in the areas permitted by community legislation	To what extent has the POR ERDF Sicily 2014-2020 contributed to reducing the infrastructural and social digital divide?	(A1) What are the main activities that have been carried out under this action with the greatest use of resources? Which of the possible ones are the least financed? (A2 - 3) What were the main actions and interventions carried out to encourage the reduction of the structural Digital Divide? (A4) What were the main actions and interventions carried out to encourage the reduction of the social Digital Divide (A5) What were the main obstacles encountered by the beneficiaries in carrying out the activities? (A6) What were the facilitating factors encountered by the beneficiaries in implementation of the activities? (A7) In what ways have all the operations carried out contributed to the reduction of digital divides in the territories and to the spread of broadband and ultra-broadband connectivity in line with the objectives set for 2020 by the European "Digital Agenda"? (A8) What are the most significant experiences? (A9) What is the opinion regarding the contribution of the operations with respect to the achievement of objective 2.1.? (O1) To what extent has the reduction of digital gaps in the territories and the diffusion of broadband and ultra-broadband connectivity? (O2) Have the results of reducing digital divides in the territories and diffusion of broadband and ultra-broadband connectivity been satisfactory? (O3) Has there been an actual increase in the use of broadband and extra-large in productive areas and in internal and rural areas? (O4) Were there any unforeseen effects of the actions/operations carried out?(O5) What were the contributions of the financed operations to the objectives of the S3 strategy?(O6) What are What were the contributions of the financed operations to the thematic areas of the S3 strategy, in particular with regard to the competitiveness of the production system? (O7) What is the relevance of the contributions of the operations carried out to the thematic areas of the S3 strategy? (O8) What are the factors that have favored (enabled) the reduction of the structural digital divide? (O9) What are the factors that have hindered the reduction of the structural digital divide? (O10) What are the factors that have favored (enabled) the reduction of the social digital divide? (O11) What are the factors that have hindered the reduction of the digital social divide?

Diagram 2 – Evaluation questions (continued)**Thematic objective 2. Improve access to information and communication technologies as well as engagement and quality thereof**

Investment priorities 2c - Strengthen ICT applications for e-government, e-learning, e-inclusion, e-culture and e-health

Specific objective	Actions	Evaluation questions (DdV)	Integrated and updated assessment questions
OS 2.2 - Digitalisation of administrative processes and dissemination of fully interoperable digital services	2.2.1 Technological solutions for the digitalisation and innovation of internal processes of the various areas of Public Administration within the framework of the public connectivity system such as justice (computerisation of civil proceedings), healthcare, tourism, cultural activities and heritage, business services.	To what extent has the OP ERDF Sicily 2014-2020 contributed to the strengthening of local public telematic services? To what extent has the OP ERDF Sicily 2014-2020 contributed to the strengthening of the administrative capacity of the PA through the diffusion of new technologies?	<p>(A1) What are the main activities that have been carried out under this action with the greatest use of resources? Which of the possible ones are the least financed? (A2-3) What was the contribution of the activities carried out to raising the quality of local public services through the digitalisation of services and administrative procedures? (A4) What are the factors that have hindered the digitalisation of administrative processes and the spread of digital services in the PA offered to citizens and businesses (in particular in healthcare and justice)? (A4) What are the factors that have hindered interventions to ensure the interoperability of banks public data? (A5) What are the factors that have favored the digitalisation of administrative processes and the diffusion of digital services in the PA offered to citizens and businesses (in particular in healthcare and justice)? (A5) What are the factors that have favored interventions to ensure the interoperability of public databases (A6) In what ways has we contributed to OS 2.2? (A7) What are the most significant experiences? (A8) Have fully interactive services been activated in the municipalities? (A9) What is the degree of use by citizens of the digital services offered by the Public Administrations, with particular reference to those related to the national health service? (A10) What is the relevance of the contribution of the financed operations with respect to the achievement of objective 2.2.</p> <p>(O1) To what extent has the digitalisation of administrative processes and the dissemination of fully interoperable digital services of the PA offered to citizens and businesses been achieved (O2) Have the results of the digitalisation of administrative processes and the dissemination of digital services been satisfactory? (O3) What have been the improvement effects of the specific digitalisation interventions of administrative processes? (O4) Has there been an effective strengthening and improvement of the quality of local public digital (telematic) services for citizens and businesses? (O5) Were there any unanticipated effects of the implemented actions/operations? (O6) What were the contributions of the implemented operations to the S3 strategy? (O7) What were the contributions of the financed operations to the thematic areas of the S3 strategy? (O8) What was the relevance of the contributions of the financed operations to the thematic areas of the S3 strategy? (O9) What are the factors that have favored the digitalisation of administrative processes and the diffusion of fully interoperable digital services of the PA offered to citizens and businesses (in particular in healthcare and justice)? (O10) What are the factors that have hindered the digitalisation of administrative processes and the spread of fully interoperable digital PA services offered to citizens and businesses (particularly in healthcare and justice)?</p>
	2.2.3- Interventions to ensure the interoperability of public databases. (The interventions primarily include large public databases, possibly also new databases, as well as those created through the associated management of ICT functions, in particular in small municipalities using, where appropriate, cloud solutions).		

3. Operations, sources of information and survey tools

In relation to the different evaluation questions connected with the different phenomena identified, the sources of information were identified and the related detection tools of both a quantitative and qualitative nature were determined, appropriately adapted to the context of the Programme.

Below are two diagrams that identify the main sources of information used for each phenomenon being evaluated.

Diagram 3 – Phenomena / Sources of information

Actions

Phenomena	Sources of information					
	Operations	Monitoring (physical/financial)	Stakeholders	Beneficiaries	Users	Case studies
Realization (A)	X	X	X	X		
Barriers/Facilitators (B)			X	X		X
Judgment regarding relevance to the OS (C)			X			
Practices (D)			X			X
Specific result (E)		X	X	X	X	

OS

Phenomena	Sources of information		
	Stakeholders	Beneficiaries	Statistics
Achievement of expected result (1)	X	X	X
Unexpected effects (2)	X	X	
OS contribution to the S3 strategy (3)	X		
Enabling/Disabling Factors (4)	X	X	

3.1 Operations

To explore each of the sources of information, the following operations were carried out:

- a desk analysis of the monitoring data and all the documents relating to the OP ERDF Sicilian Region 2014-2020 and the financed operations (Operational plan, Eligibility requirements and selection criteria for operations, Annual implementation report, Methodological document on indicators (of result and output))

and performance framework of the OP, Summary of the decisions of the Monitoring Committee of the ERDF OP 2014-2020, etc.);

- **in-depth interviews with key stakeholders** involved in the OP as representatives of the Sicilian Region, technological districts and businesses, public and private research centers and universities (with particular reference to the ILO and UTT offices and the Rector's delegates for technology transfer);
- **survey on the beneficiaries of the interventions** (with CAWI methodology) through a structured closed-ended questionnaire, administered via the web to a representative sample of beneficiaries and the use of an IT tool for track recording of the responses;
- **survey on users of the SovraCUP service** (with CAWI methodology) using a structured questionnaire closed-ended, administered via web to a representative sample of adult Sicilian citizens.
- **study of cases** involves an in-depth examination of practices implemented by beneficiaries, selected based on the results of stakeholder interviews and a survey of beneficiaries, chosen through a specific procedure.

In particular, the case study involved an in-depth examination of practices implemented by beneficiaries based on criteria such as the actual impact on the S3 Strategy, feasibility, and sustainability. The cases were selected through a procedure that involved successive steps, as described below.

Step 1: Identification of an **initial list of practices** selected based on the following three main criteria:

- **Report from stakeholders and/or beneficiaries:** Practices that have been mentioned or around which there is noticeable discourse within the community or relevant environment were considered of primary interest.
- **Completeness of information:** The ability of the promoters of the practice to provide detailed information (e.g., on the beneficiary/partner's website, available project documents, or through testimonials or interviews) regarding the practice was evaluated and rewarded. This includes information about its goals and implementation methods, as well as reflections on encountered obstacles, facilitating factors, or potential forms of replication.
- **Relationship with the S3 Strategy:** The connection with the objectives and areas of the S3 Strategy was verified

Step 2: **Further selection** of gathered practices by applying an '**entry threshold**' determined by the satisfaction of the following criteria:

- **Condition of actual impact**, i.e., concrete effects related to the S3 Strategy.
- **Feasibility conditions**, i.e., the presence of success factors enabling the implementation of various actions planned within the experience.
- **Sustainability conditions** to ensure the continuity of intervention results and their potential replicability.

Step 3: **In-depth analysis and formal documentation of practices:** Once a practice was deemed of interest and evaluated based on the aforementioned criteria (impact, feasibility, sustainability), dedicated sheets were prepared with the description of essential identifying elements. These included, for example, the scope related to the S3, productive sectors and/or areas of reference for the practice, entities involved in partnerships, activities carried out, achieved results, etc.

Diagram 4 – Information sources / Tools*Sources / Tools*

Sources of information	Desk analysis	In-depth interviews	Survey	Case studies
Operations	X			
Monitoring (physical/financial)	X			
Statistics	X			
Stakeholders		X		
Beneficiaries			X	X
Key informants / privileged witnesses				X
Service users			X	

3.2 Sources

Below is the list of sources of information used.

Documentary sources

Monitoring Committee PO ERDF 2014-2020, Minutes of the Monitoring Committee 14 December 2022

Istat, Business. Sicily Report 2019

Istat, Territorial indicators for development policies, <https://www.istat.it/it/archivio/16777>

Lentini C., Smart Specialization Strategy - S3 Sicily 2014-2020, 2015

MET, The Smart Specialization Strategy in Sicily: diffusion and peculiarities 2015-2020 (pre-Covid-19 situation and first reactions to the pandemic), August 2021

Minister for Technological Innovation and Digital Transition, Ministry of Economic Development, Italian Strategy for Ultra-Broadband “Towards the Gigabit Society”, 25 May 2021

Presidency of the Council of Ministers, Cohesion Policy in support of research and innovation, 2017

Sicilian Region - Regional Department of Productive Activities, DDG 1350/6.S Public notice Action 1.1.2, 2017

Sicilian Region - Regional Department of Productive Activities, DDG 1348/6.S Public notice Action 1.1.3, 2017

Sicilian Region - Regional Department of Productive Activities, DDG 1349/6.S Public notice Action 1.1.5, 2017

Sicilian Region - Regional Department of Productive Activities, DDG 236/6.S Establishment of the Agri-food Sector thematic working group, March 2021

Sicilian Region - Regional Department of Productive Activities, DDG 243/6.S Establishment of the Thematic Working Group in the Blue Economy Area, March 2021

Sicilian Region - Regional Department of Productive Activities, DDG 244/6.S Establishment of the Tourism Sector thematic working group, March 2021

Sicilian Region - Regional Department of Productive Activities, DDG 245/6.S Establishment of the thematic working group in the Smart cities area, March 2021

Sicilian Region - Regional Department of Productive Activities, DDG 711/6.S Establishment of the Energy Sector thematic working group, May 2021

Sicilian Region - Regional Department of Productive Activities, DDG 712/6.S Establishment of the thematic working group in the Life Sciences sector, May 2021

Sicilian Region, Digital Agenda. An opportunity to make Sicily more competitive, March 2018

Sicilian Region, Annex 10 – List of S3 sub-areas eligible for projects, 2017

Sicilian Region, Explanatory document to support the reprogramming of the OP ERDF Sicily 2014/2020, July 2023

Sicilian Region, Methodological document on indicators (result and output) and performance framework of the OP ERDF 2014-2020, Annex to Section 2 OP ERDF 2014-2020 Sicilian Region, Version 14 July 2023

Sicilian Region, Information on the implementation of the Communication Strategy, July 2023

Sicilian Region, Information on evaluation activities and proposal to modify the 2014-2020 Evaluation Plan. Supervisory Committee of 07/26/2023

Sicilian Region, Evaluation Plan of the cohesion policy 2014-2020 of the Sicilian Region PO ERDF, January 2020

Sicilian Region, PO ERDF Sicily 2014/2020. Summary framework on the reprogramming proposal and closure prospects July 2023, 10 July 2023

Sicilian Region, POR Sicily ERDF, 2014

Sicilian Region, Summary framework on the reprogramming process and closure prospects, July 2023

Sicilian Region, Summary framework on the reprogramming proposal of the OP ERDF Sicily 2014-2020, July 2023

Sicilian Region, Eligibility requirements and selection criteria for operations Adopted with Resolution no. 266 of 27 July 2016 and subsequent amendments Updated on 09 February 2023

Sicilian Region, State of progress of territorial planning - SICILY, 18 July 2023

Sicilian Region - Department of Economy - Regional Authority for Technological Innovation, Three-year Plan for the Digital Transition of the Regional Administration for the years 2021 - 2023 and Annual Plan 2021, 2021

Sicilian Region - Department of Productive Activities - Department of Productive Activities - Service 6.S Technical Unit for Coordination of the regional innovation strategy, Implementation and Monitoring Report of the S3 Sicily 2014-2020. Data available as of July 31, 2018, September 2018

Sicilian Region - Department of Productive Activities - Department of Productive Activities - Service 6.S Technical Unit for Coordination of the regional innovation strategy, Implementation and Monitoring Report of the S3 Sicily 2014-2020. Data available as of December 31, 2019, May 2020

Sicilian Region - Department of Productive Activities - Department of Productive Activities - Service 6.S Technical Unit for Coordination of the regional innovation strategy, Implementation and Monitoring Report of the S3 Sicily 2014-2020. Data available as of December 31, 2020, October 2021

Sicilian Region - Department of Productive Activities - Department of Productive Activities - Service 6.S Technical Unit for Coordination of the regional innovation strategy, Self-assessment report for the fulfillment of the criteria relating to the enabling condition 1 "Good governance of national or regional smart specialization strategy", October 2022

Sicilian Region - Department of Productive Activities - Department of Productive Activities, Regional Innovation Strategy for Intelligent Specialization S3 Sicily, for the period 2014-2020, June 2016

Sicilian Region - Department of Productive Activities - Department of Productive Activities, Regional Innovation Strategy for Intelligent Specialization S3 Sicily, update for the 2021-2027 programming period, May 2022

For the realization of the network analysis and the analysis of co-financing, the decrees of the general director (DDG) granting contributions to projects financed with Action 1.1.5 were also examined.

Stakeholder Sicilian Region

Regarding OT1, in-depth interviews were carried out with:

- Giuseppe Ammavuta, Department of Productive Activities - Director of Service 5.S Technological innovation and policies for economic development;
- Claudia Lentini, Department of Productive Activities - Expert support in the management and implementation of the actions within her competence in relation to the ERDF Regional Operational Program 2014-2020.

In reference to OT2, in-depth interviews were carried out with:

- Gaspare Bianco, Regional Department of Economy, Regional Authority for Technological Innovation, Director of Service 2 - Control and verification of the management and management of healthcare infrastructures and information systems;
- Francesco Corso, Regional Department of Economy, Regional Authority for Technological Innovation, Director of Area 3 - Coordination of Technological Innovation, Sicilian Region;
- Carmelo Notaro, Regional Department of Economy, Regional Authority for Technological Innovation, Manager of Area 2 - Interdepartmental Area Front-end Departments, of the Office for Coordination Activities of Digital Information Systems.

Qualified informants

In-depth interviews were carried out with:

- Sabrina Conoci, Rector's Delegate for the Third Mission - University of Messina, CNR, Micro and Nanosystems Technological District of Sicily, Biomedical District;
- Luca Giaimi, Operations Director IOM Research, Mediterranean Oncology Institute, Sicily Biotec District;
- Simone Panfiglio, Project Manager, Sicily Navtec.

Beneficiaries

The beneficiaries were consulted through surveys carried out in the periods:

- OT1, July 25 – September 5, 2023;
- OT2, August 28 – September 25, 2023.

The beneficiaries received via certified email the request to complete the CAWI questionnaire and, a week before the closure, a reminder. Below are the responses received:

- Action 1.1.2, 200 beneficiaries, 119 responses (59.5%);
- Action 1.1.3, 13 beneficiaries, 10 responses (76.9%);
- Action 1.1.5, 69 beneficiaries, 54 responses (78.3%);
- Action 2.2.1, 41 beneficiaries, 10 responses (24.4%);
- Action 2.2.3, 32 beneficiaries, 6 responses (18.8%).

Survey SupraCUP

In order to evaluate knowledge, use and level of satisfaction, 402 interviewees were selected through a stratified quota sampling procedure and administered a structured questionnaire in CAWI mode. The sample is representative of the adult population resident in Sicily by gender, age and province of residence. The margin of error on the estimates, for a 95% confidence interval, is equal to 4.89%. The survey was conducted between 16 and 20 November 2023.

Project data

Files of projects financed on OT1 (actions 1.1.2, 1.1.3 and 1.1.5), data received from the Department of Productive Activities on 12 July 2023

Files of projects financed on OT2 (actions 2.1.1a, 2.1.1b, 2.2.1, 2.2.3), data received from the Regional Department of Economy, Regional Authority for Technological Innovation on 1 August 2023

Note regarding project data

On 12 September 2023, the monitoring data of the Caronte platform validated by IGRUE, as of 30 June 2023, were received by the Presidency of the Sicilian Region, Department of Programming.

The data were compared with those received from the managers of the Sicilian Region (Department of Productive Activities and Regional Department of Economy, Regional Authority for Technological Innovation) responsible for the actions (RUP and RIO) and some discrepancies emerged. By way of example:

- Action 1.1.2: 247 projects with "In implementation" status resulting from the Caronte platform, compared to the 200 projects resulting from the data of the Department of Productive Activities;
- Action 1.1.5: 73 projects with "In implementation" status resulting from the Caronte platform, compared to 69 projects resulting from the data of the Department of Productive Activities;

Action 2.2.1: 43 with "In implementation" status resulting from the Caronte platform, compared to the 41 resulting from the data of the Regional Department of Economy - Regional Authority for Innovation.

As discussed in the Evaluator's meeting with the Steering Group (4 October 2023), the data reported in this report, particularly regarding financial and procedural progress, refers to data provided directly by the executives responsible for the actions.

Indicator files (planned values, achieved values) updated to 31 August 2023, data received from the Presidency of the Sicilian Region, Department of Planning on 10 October 2023

The data used for the network analysis and for the analysis of the co-financing of companies for the implementation of the projects were taken from the decrees of the general manager (DDG) granting the contribution for Action 1.1.5 (<http://euroinfosicilia.it>).

List of cases examined

Action 1.1.2

- ABC Medical Project
- Ecological Packaging Project
- L2-L4 Smart project
- MIWT project
- Netith Project
- Ppservices project
- Webgenesys project
- Yes School Project

Action 1.1.3

- Caremed project
- Ehtna project
- NonSacWine project
- SicilyKiosk project
- Smart Road 4.0 project

Action 1.1.5

- Nutraceutical and Health Food Project
- Biospec Project 3
- Cowtech project
- DiOncoGen Project
- Lab@Home project
- Innovative Solutions Project for High Energy Saving Naval Vessels - SI-MARE

Action 2.2.1

- SovraCUP project

3.3 Data Collection Tools

To explore the specified sources, the following data collection tools were employed:

- Desk analysis grid
- Stakeholder questionnaire
- Beneficiary questionnaires OT1 and OT2 (CAWI survey)
- Case study analysis grid
- Questionnaire for citizens using the SovraCUP service (CAWI survey)

APPENDIX 2- OVERBANKING INVESTIGATION REPORT

Below is attached the CAWI survey report on adult Sicilian citizens regarding the SovraCUP service. The survey is carried out by IZI between 16 and 20 November 2023.

THE OVERCAPACITY SERVICE OF THE SICILIAN REGION

Survey by



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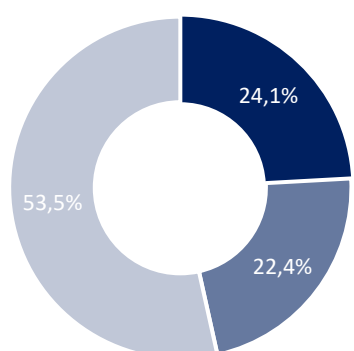
1. METHODOLOGICAL NOTE

The SovraCUP system of the Sicilian Region is dedicated to booking specialist visits and diagnostic tests in regional health authorities. In order to evaluate knowledge, use and level of satisfaction, 402 interviewees were selected through a stratified quota sampling procedure and administered a structured questionnaire in CAWI mode. The sample is representative of the adult population resident in Sicily by gender, age and province of residence. The margin of error on the estimates, for a 95% confidence interval, is equal to 4.89%.

2. KNOWLEDGE AND USE OF THE SERVICE

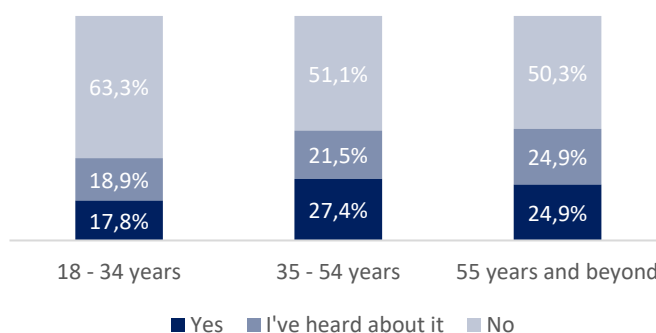
Knowledge

Do you know the SovraCUP booking system?



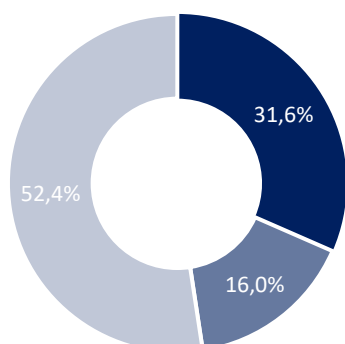
■ Yes ■ I've heard about it ■ No

About 47% of the sample responded positively to the question "do you know the SovraCUP booking system", but 22% had only heard of it. In terms of age, knowledge is more widespread in the 35–54-year-old class; young people, on the other hand - under 34 - represent the least informed part of the population.



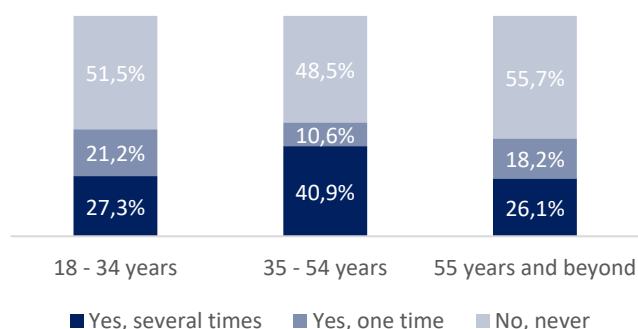
Usage

Have you ever used the SovraCUP booking system?



■ Yes, several times ■ Yes, one time ■ No, never

Those who have at least heard of it were asked if they have used it: the result is that approximately 46% of those interviewed answered in the affirmative. This is 22% of all respondents. And, as for knowledge, also for use the highest value is recorded in the 35-54 age group, equal to approximately 41% of them.

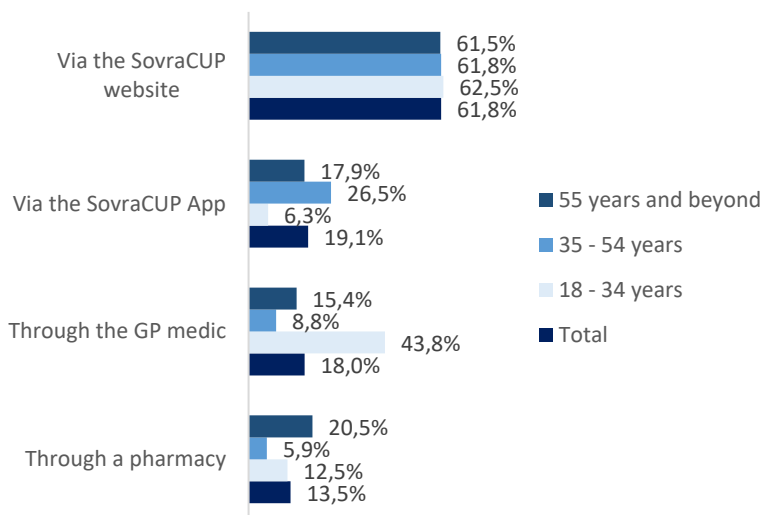


3. OPINIONS AND RATINGS ON THE SERVICE

The entire section is dedicated to interviewees who say they have used the service at least once.

Access mode

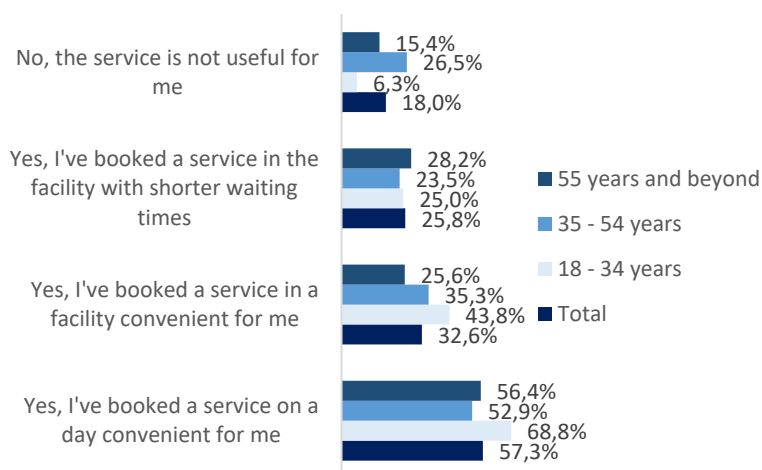
Which channel did you use to access SovraCUP? More than one response allowed



By far the most used access channel is the SovraCUP website, used by 61.8% of respondents. Following this, 19.1% of respondents accessed the service via the App and 18% via their GP. In terms of age, respondents between 35 and 44 tend to use the App more, while young people rely on their GP.

Perceived usefulness

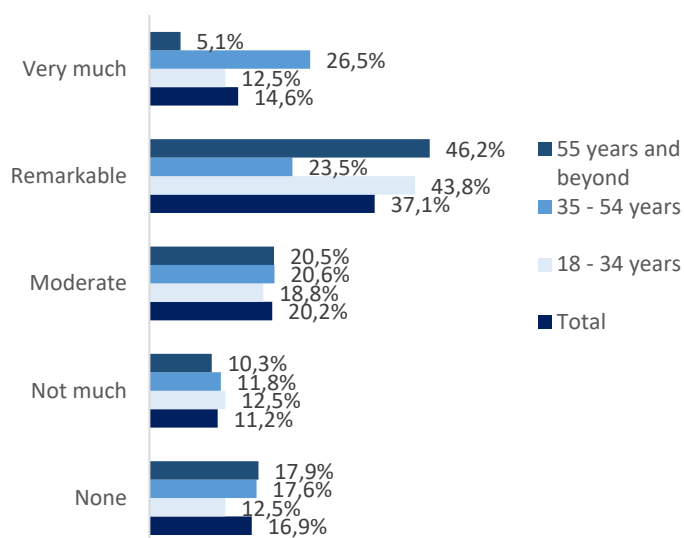
Did you find the service useful? More than one response allowed



Overall, 72% of users considered the service useful; It should be noted, in particular, that the highest figure belongs to those under 34.

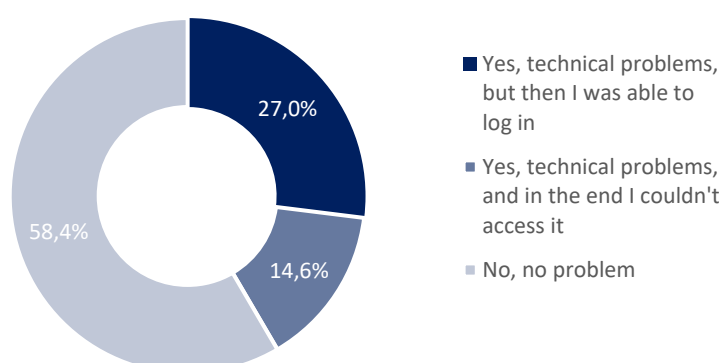
57% booked a service on a convenient day and 32% in a convenient location.

How much time did you save by using SovraCup for your reservations?



In addition to considering it useful as a service, those interviewed maintain that it also allows them to save time - 83% of respondents said this -. In particular, those over 55 and under 34 say more than others that they have saved considerable time while 26% of those interviewed between 35 and 54 years old say they have saved a lot of time. We therefore perceive satisfaction with the service from the point of view of efficiency and usefulness.

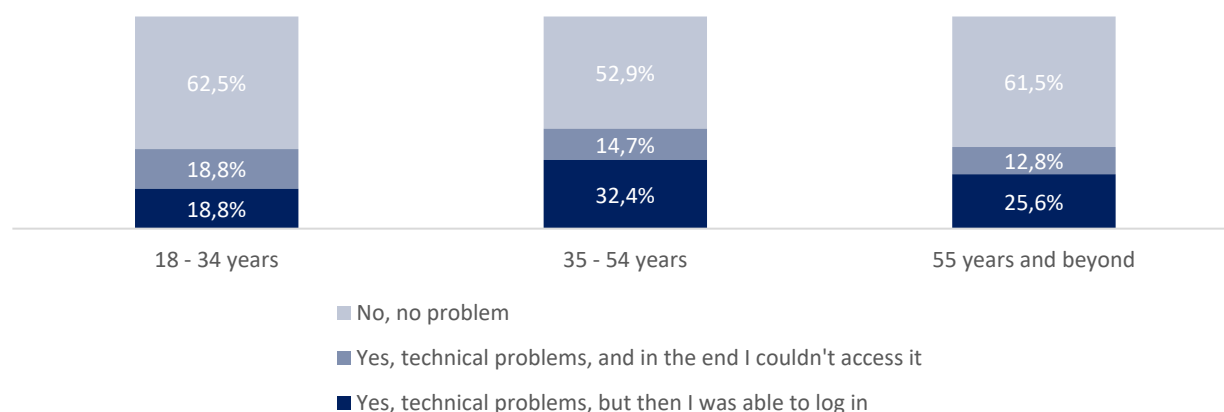
Did you have any problems accessing SovraCUP?



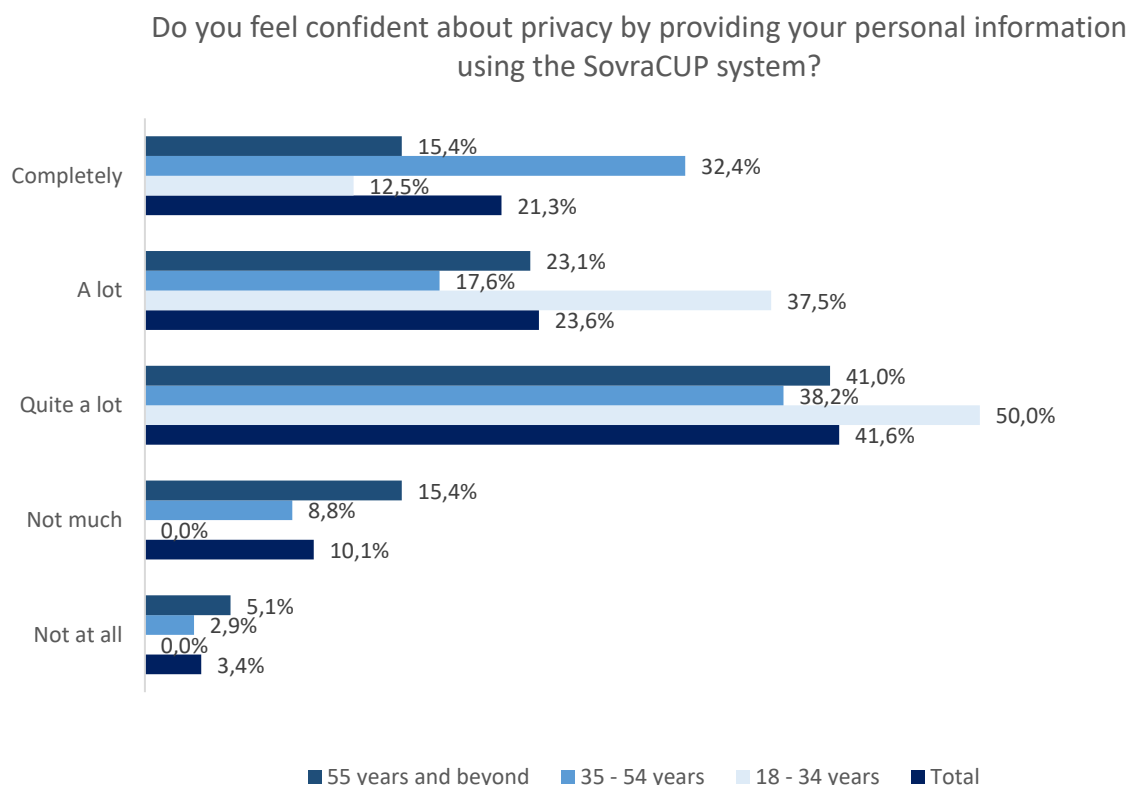
Problems and safety

The service, based on the perception and experiences of users, also seems to respond well from a technical point of view, so much so that around 6 out of 10 say they have not experienced any problems; another 27%, however, had problems but eventually managed to access it.

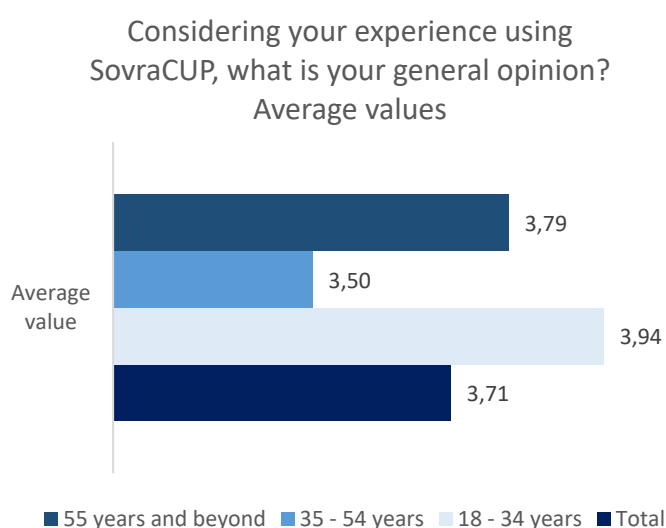
In terms of age, those who have recorded the most problems are users between the ages of 35 and 54, but they are also those who, after the problems encountered, were able to access more than others.



Another aspect under investigation concerns users' perception of security in providing personal information: the data shows that only 13% feel little or not at all confident in this aspect. The users who feel most safe are those aged between 35 and 54 (32.4% of them say they feel completely safe).

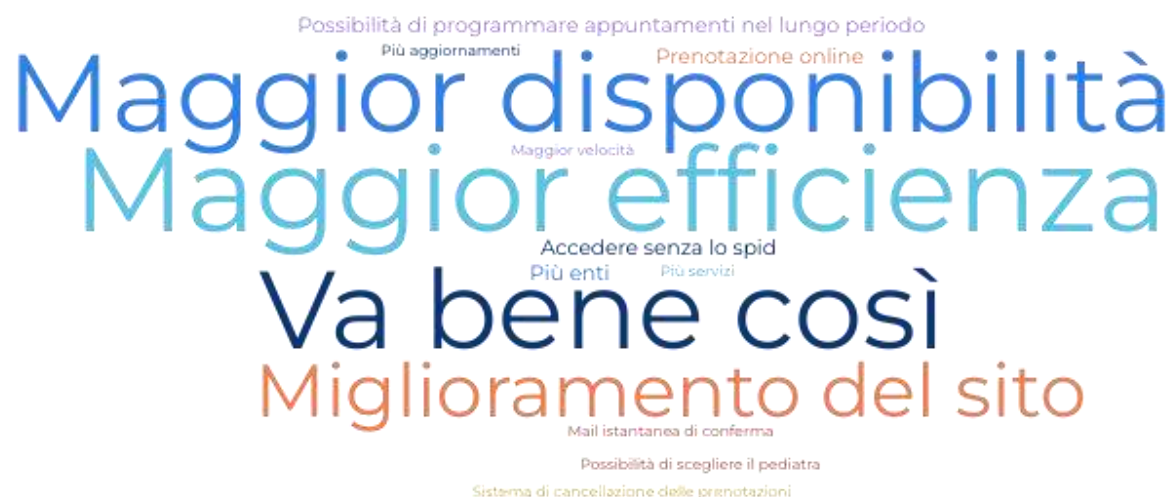


Performance



Subsequently, interviewees were asked to give, on a scale of 1 to 5, an overall rating of their experience. Across all users, the service gets an average rating of 3.71. Compared to users of other age groups, those under 34 are the most satisfied.

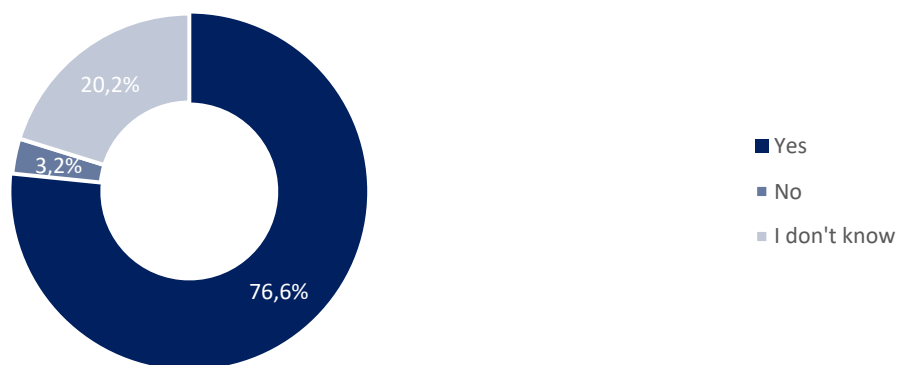
Furthermore, in the form of an open response, users were asked how they could improve the service. Various ideas were detected, some similar, others less so, and for convenience they have been reported via a wordcloud.



Mostly, among those who suggest improvements, reference is made to the efficiency of the service and the improvement of the site. However, there is also no shortage of quotes regarding the availability of appointments.

Finally, interviewees were asked whether the digital innovation services provided by the Public Administration are useful for citizens. The answers leave little room for interpretation, with 76%, over 3 out of 4 users, responding positively. Furthermore, the judgment is so convinced that it is homogeneous within the age groups considered.

In general, do you think that digital innovation services provided by the Public Administration are useful for citizens?



CONCLUSIONS

In conclusion, the analysis of the data collected highlights a complex panorama regarding the knowledge and use of the SovraCUP booking system. While 47% of the sample claims to know it, 22% have only heard of it, underlining a need for greater dissemination and information, especially among young people under 34. The use of the service shows significant interest, recording a peak in the aged 35-54 years. The main access channel appears to be the SovraCUP website, used by 61.8% of respondents. General satisfaction with the service is notable, with 72% of users considering it useful, and there is particular appreciation from those under 34. The perception of time savings is widespread, with 83% of interviewees stating to have benefited from it. On the technical side, the majority of users did not encounter any problems accessing the service, but it is interesting to note that 27% overcame any difficulties. Security in providing personal information is a notable aspect, with only 13% of respondents feeling slightly or not at all secure; furthermore, 32.4% of users aged between 35 and 54 say they feel completely safe. Finally, the overall evaluation of the user experience stands at an average of 3.71 out of 5, with particularly high satisfaction among those under 34. The open responses regarding the improvement of the service highlight the request for greater efficiency, improvements to the site and the availability of appointments. The general acceptance of the digital innovation services proposed by the Public Administration, with 76% positive responses, suggests a favorable predisposition of citizens towards the adoption of innovative solutions in the public context.