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Assessing Smart Specialisation:

POLICY IMPLEMENTATION MEASURES

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Contents

Abstract

The objective of this report is to provide an account of how and to what extent the Smart Specialisation approach to regional innovation policy has been implemented in practice. The analysis explores how policy measures implemented under the Thematic Objective 1 "Strengthening research, technological development and innovation" of national and regional Operational Programmes, co-financed by the European Regional Development Fund, have incorporated key Smart Specialisation principles during the 2014-2020 programming period. We identify three main design principles of Smart Specialisation and translate them into three research hypotheses characterized in ways that can be tested empirically.

We find that the Smart Specialisation strategies under scrutiny mostly apply a limited portfolio of traditional, supply-side instruments. All things considered, there is limited evidence of the implementation of a truly selective intervention logic aimed to support in a dedicated way different investment priorities. We observe quite pervasive support to the establishment of a critical mass of individual and collaborative entrepreneurial initiatives in all the Smart Specialisation areas, while support to the formation and strengthening of stakeholder communities is only present in a very few territories. We find positive although not widespread evidence of the introduction of novel elements in the design of some instruments; this points to a tentative break with tradition and path dependency which is in line with the spirit of Smart Specialisation.

Policy implications for the future development and evolution of European regional innovation policy are derived.

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Executive summary

This report offers an unprecedented account of how and to what extent the Smart Specialisation approach to regional innovation policy has been implemented in practice. The analysis explores how policy measures implemented under the Thematic Objective 1 "Strengthening research, technological development and innovation" of national and regional Operational Programmes, co-financed by the European Regional Development Fund (ERDF), have incorporated key Smart Specialisation principles during the programming period 2014-2020. The report in particular focuses on assessing the alignment of policy measures with the investment priorities selected by Smart Specialisation strategies. It also explores to what extent the implemented measures have promoted collaborations between different actors (namely between companies and research organisations) and the set-up and strengthening of stakeholder communities in Smart Specialisation priority areas. The report draws on data deriving from 537 calls for projects launched under 22 ERDF Operational Programmes at national and regional level in Italy, Poland, Spain, Finland, Hungary, Slovenia, Germany, and Sweden by mid-2020.

Policy context

Almost eight years have passed since the Smart Specialisation approach to regional innovation policy was incorporated in European Cohesion policy. On the verge of the new Cohesion policy financial cycle, it is now the right time to assess the Smart Specialisation experience and support the design of the upcoming generation of strategies with sound evidence on what has worked and what not. While writing, the COVID-19 pandemic is sweeping Europe and the entire planet, causing harsh health, social, and economic difficulties. In the context of the recovery effort to overcome the crisis, the Smart Specialisation approach can play a central role in supporting innovative activities that help territories discover new opportunities for more sustainable and inclusive economies. A necessary condition for this is to examine critically the Smart Specialisation experience starting from the processes deployed in the territories and using data on the real implementation of the policy.

Key conclusions

The evidence we gathered in this study altogether may reveal that the necessity for policy measures that follow the vertical logic of intervention of Smart Specialisation should be systematically assessed against the competing need for more horizontal measures. The use of demand-side instruments, the strengthening of stakeholder communities, and, to a less extent, the diffusion of experimental policy measures are all areas where improvement is needed and possible.

Main findings

Smart Specialisation strategies mostly apply a limited portfolio of traditional, supply-side instruments. All things considered, there is limited evidence of the implementation of a truly selective intervention logic aimed to support in a dedicated way different investment priorities. We observe quite pervasive support to the establishment of a critical mass of individual and collaborative entrepreneurial initiatives in the Smart Specialisation areas. On the contrary, we find limited support to the formation and strengthening of stakeholder communities. We find positive although not widespread evidence of the introduction of novel elements in the design of some policy instruments.

Related and future JRC work

The report builds on previous JRC work (Gianelle et al., 2017, 2018, 2020), end extend it in several directions. In particular, we increased the scope of the analysis in order to include the collaborative dimension of policy measures and the creation and strengthening of stakeholder communities. The current report also uses a broader database than previously done, covering more territorial entities and including data over a longer time span. This report provides in a transparent way all methodological elements needed in order to replicate

the analysis and can be the basis for subsequent studies aimed at improving our understanding of how Smart Specialisation has been implemented in practice.

Quick guide

The report is organized as follows. Section 1 provides an introduction. Section 2 offers a review of the most recent literature on the implementation of the Smart Specialisation policy. Section 3 contains the analytical methodology; it introduces three key design principles of the Smart Specialisation implementation measures; next, it translates those principles into three research hypotheses that can be empirically tested; finally, it describes additional dimensions that are relevant for the analysis. Section 4 provides a detailed description of the data used in the analysis. Section 5 presents the results. Section 6 offers a discussion of the evidence we gathered. Finally, section 7 presents some key policy recommendations.

1. Introduction

The existence of national and regional innovation strategies for Smart Specialisation (S3) was a specific *ex-ante* conditionality for accessing resources for research and innovation investment during the 2014-2020 programming period of the EU Cohesion policy. On the basis of a participatory approach (entrepreneurial process of discovery), regions across Europe and some Member States were required to identify a set of innovation priority areas on which to concentrate public support (European Union, 2013).

Almost eight years have passed since the introduction of S3 strategies. Over this period, European Member States and regions have been moving from the design of their strategies to the implementation stage. The objective of this report is to provide an account of how and to what extent the Smart Specialisation approach to regional innovation policy has been implemented in practice.

In particular, the analysis explores how policy measures implemented under the Thematic Objective 1 (TO1) "Strengthening research, technological development and innovation" of national and regional Operational Programmes (OPs), co-financed by the European Regional Development Fund (ERDF), have incorporated key S3 principles. The information examined is extracted from 537 calls for projects launched under 22 OPs at national and regional level in Italy, Poland, Spain, Finland, Hungary, Slovenia, Germany, and Sweden by mid-2020.

We identify three main S3 design principles and translate them into three hypotheses characterized in ways that can be tested empirically. The research hypotheses are: (i) S3 is a selective policy that concentrates public intervention on a few investment priorities; (ii) S3 favours the establishment of a critical mass of entrepreneurial initiatives in identified investment areas; (iii) S3 promotes the organization and strengthening of stakeholder communities. In order to better contextualise the analysis, we also provide a thorough description of several additional dimensions along which to analyse the data.

To the best of our knowledge, this is one of the few existing studies to examine systematically actual policy measures under the European Cohesion policy and their coherence with the Smart Specialisation conceptual framework. The analysis is also significant in quantitative terms; taken together, the territorial entities we study are the recipients of nearly a third of the ERDF available for research and innovation policy in the European Union, and the resources allocated during the period under scrutiny amount, on average, to nearly the entire budget available to those territories for the whole financial period 2014-2020.

The report is organized as follows. Section 2 provides a review of the most recent literature on the implementation of the Smart Specialisation policy. Section 3 contains the analytical methodology; it introduces three main design principles of the Smart Specialisation implementation measures; next, it translates those principles into three research hypotheses that can be empirically tested; finally, it describes additional dimensions that are relevant for the analysis. Section 4 provides a detailed description of the data we use in the analysis. Section 5 presents the results. Section 6 offers a discussion of the evidence we gathered. Finally, section 7 provides some key policy recommendations.

2. Review of the recent literature

2.1 Smart specialisation within the phases and frameworks for innovation policy

The starting point of this literature review is the place of Smart Specialisation within the various strands of policy instruments linked to innovation policy. Schot & Steinmueller (2018) identify three different frameworks for policies related to science, technology and innovation that have emerged in different moments:

(i) According to the eldest framework, public policy related to innovation was deemed to be implemented because it could help the growth of countries and regions, due to the fact that innovation accelerates growth and public intervention can accelerate innovation, for instance by providing the right incentives and solving the market failures.

(ii) The second framework arose in the 1980s and maintained that the target for policy should be the way in which systems perform innovation, because it would be possible to improve the innovative capability of e.g. business clusters by making innovation systems work better, targeting the right connections, stimulating learning among the various actors of the systems, and sustaining clusters and networks.

(iii) The most recent strand sees innovation policy as useful to foster transformative change in local systems, so that innovation policy can accompany and stimulate such a change; this framework is particularly helpful in a context in which innovation policy is no longer only devoted to stimulate growth or competitiveness, but also to help innovative activities to achieve broader socio-economic goals such as sustainability and even more broadly defined societal development targets.

Smart Specialisation strategies are to be considered in the roots of *transformative innovation policies*, although their aims have remained quite traditional in terms of growth and competitiveness for the time they have been in place. The ideas of Smart Specialisation, in fact, were developed consistently with the wide corpus of place-based regional policies, by which regional policy, and regional innovation policy in particular, has to focus on tapping the untapped potentials of regions, which allows to pursue cohesion and competitiveness at the same time (Barca, 2009; Barca et al., 2012; Foray, et al., 2009; Foray et al., 2015; McCann, 2015; McCann and Ortega-Argilés, 2015). As a consequence, regional innovation policy becomes a process highly adapted to the regional context and aware of the dynamics of its implementation (Fratesi, 2015; Fratesi and Perucca, 2019).

Since the official launch of Smart Specialisation strategies under the European Cohesion policy in 2014, evidence has been accumulating which allows to learn things from the policy actual design, implementation and results in the various regions of the EU. The available literature accounting for such evidence is comprised of a number of academic papers and policy reports, most of them focusing on specific cases. The present review focuses on results whose relevance may be general and, therefore, on a selection of recent academic papers and of reports produced for the European Commission. It has to be considered that, as shown by Mora et al. (2019), the number of academic papers related to Smart Specialisation is exponentially increasing, even if the literature continues to cluster around a few seminal and defining contributions (Capello & Kroll, 2016; Foray, 2015; Iacobucci, 2014; McCann & Ortega-Argilés, 2015).

The following sub-sections concentrate on what is relevant for the implementation of S3, and hence cover different aspects of the Smart Specialisation policy with a focus on what has been realized on the ground and concentrating on the following elements: (i) selectivity of the policy intervention, (ii) prioritization through the *entrepreneurial discovery process*, (iii) the collaborative dimension of the policy, (iv) governance and capabilities as enabling factors.

It should be noted that empirical evidence on Smart Specialisation still mostly concentrates on the design of the strategies and their coherence with the Smart Specialisation principles, while very few are the contributions on actual implementation and still missing those on results, which is expected considering that programming period 2014-2020, which allows for the possibility to finance projects up to 2023, has not ended yet.

2.2 Selectivity of policy intervention

Gianelle et al. (2020), building on previous work (Gianelle et al., 2017, 2018), investigate to what extent the actual implementation of Smart Specialisation strategies follows its defining purposes, using information coming from the strategies and the calls for projects of regions belonging to seven EU countries. Policy measures following the logic of Smart Specialisation, in fact, should involve three related conditions: (i) the identification of priority areas for policy intervention, (ii) the alignment of calls for projects with priority areas, (iii) the differentiation of policy measures across priority areas. To the best of our knowledge, those are the only available studies that analyse the way Smart Specialisation was implemented on the ground starting from the information contained in the actual policy measures (calls for projects) issued by regional and national authorities in charge of the Smart Specialisation policy.

The analysis shows that, even if the identified priority areas fit with the S3 logic, there is a suspect high number of priorities; moreover, calls' alignment with priorities, despite the existence of some specific mechanisms, is not always present; finally, most of the calls address all priorities at the same time, which is at odd with the third condition. As a consequence, it still seems that the implementation of S3 is too similar to the old horizontal regional industrial policy.

The possible impact of the lack of selectivity in industrial policy is discussed by Crawley & Hallowell (2020) using the evidence from an older US programme, the Main Economic Improvement Fund (MEIF). In that case, the creation of employment was not accompanied by improvements of productivity, also because the prioritisation led to diversification through the addition of broad sectors, because of path-dependence in the identification of priorities, and, finally, because of the absence of an effective method to identify priorities.

Smart Specialisation did introduce a method for priority identification based on broad stakeholder involvement and, most of all, the involvement of the private sector (the entrepreneurial discovery process), but the extent to which this resulted in actual selection of prospective intervention areas and consequent concentration of policy support is uncertain; hence, the risk of diluting policy impact remains actual.

2.3 Prioritization through the entrepreneurial discovery process

In a paper not directly concerned with Smart Specialisation but whose outcomes are highly relevant to the entrepreneurial discovery process, Neffke et al. (2017) distinguish between *industrial change* ("regional diversification which changes the local industry composition", p. 27) and *structural change* ("the unrelated regional diversification that requires a transformation of the local capability base", p.27) and show that different types of economic agents have different propensity to change, with incumbents reinforcing the current focus, and most of the change actually being induced by the establishment of firms and entrepreneurs from outside the region. This has to be considered for Smart Specialisation strategies because an entrepreneurial discovery process based on local agents risks being too conservative. This perspective is reinforced by Sotarauta (2018) in a conceptual paper that delves into some possible traps in the implementation of Smart Specialisation, evidencing how the entrepreneurial discovery process is inherently subject to strong influence by place leadership, because the process is guided by those actors possessing vision and/or influence.

Aranguren et al. (2019) analyse the characteristics of the S3 governance in eight selected and diverse cases, adopting the *quadruple helix* as conceptual model. Their analysis covers the set-up phase of Smart Specialisation (2014-2015) and focuses on the entrepreneurial discovery process to show that civil society was little involved, with the government taking the largest role; moreover, there was very little coordination with other territories, irrespective of the governance arrangements; finally, path dependence was evident in all cases, with consequences on both how the entrepreneurial discovery process was organized and its outcome in terms of selected priorities.

D'Adda et al. (2019) elaborate on the technological domains identified in the strategic documents of Italian regions and compare them with regional strengths (measured in terms of existing specialisation or patent data) in order to see whether the entrepreneurial discovery process was able to identify specialisations that are coherent (related) with the existing territorial competences and economic fabric. Regional coherence is found to be quite heterogeneous, although most regions seem to have identified technological domains narrower than the ones they already possessed.

By comparing the existing contributions that seek to understand how effective the entrepreneurial of discovery has actually been, the tension is evident between "building on the past" and "breaking with the past". The former tendency may guarantee higher coherence of prioritization with the existing regional knowledge base, but also it may represent too a conservative approach, with little potential for change and prone to capture by vested interests. The latter tendency, while offering potentially higher chances for transformation, presents the risk of building projects with feet of clay which have little possibility to grow and expand due to lack of forward and backward linkages with the local economic fabric and knowledge base.

2.4 The collaborative dimension of the policy

The issue of cooperation and collaboration between stakeholders and innovation actors more in general is of utmost importance for a sound implementation of Smart Specialisation. The policy indeed is quite demanding in terms of both the number of stakeholders potentially and actually involved and the complexity of the relationships which need to be established among them.

Ghinoi et al. (2020) investigate these issues in the case of a region in the northern periphery of Finland and find that, despite the fact that S3 has increased intra-regional cooperation, two difficulties arose in the policy implementation, one related to the development of stakeholder networks, and the second one related to the lack of entrepreneurial activities, so that in order to have successful implementation a greater focus on stakeholder engagement is needed in order to mobilize resources for specialised diversification.

Notice that, however, inducing collaboration among actors through subsidies is not a guarantee for the success of the policy, as illustrated by Crescenzi et al. (2020). The analysis of a large programme for collaborative industrial research which was performed in Italy in the 2007-2013 Cohesion policy programming cycle – hence before the launch of Smart Specialisation, but exhibiting some policy characteristics which anticipated it – shows a substantial failure in boosting investments' value added or employment in beneficiary firms, and not even the collaborative dimension added significant value apart in some low tech sectors.

The importance of intra-regional connections is also evidenced by Iacobucci & Guzzini (2016) who study the S3 strategies approved by Italian regions in order to check whether the principles of relatedness and connectivity – which require regions to identify links and synergies between technological domains in the regions – were fully implemented. In the examined cases, the acknowledgement and analysis of such links was generally inadequately addressed, most likely due, on the basis of anecdotal evidence, to the absence of sound and established methodologies to do that.

Connections at interregional level are also needed; this is an aspect which is little developed in most existing Smart Specialisation strategies, but which has recently been investigated in a number of papers, such as the one by Uyarra et al. (2018) which looks specifically at the capacity of S3 to contribute to external cooperation.

The result is that an outward orientation is rarely embedded in S3, which is a limitation, because it prevents entrepreneurs to find collaborations, technologies and experiences out of the rigid administrative boundaries of their territories.

Extra-regional collaborations, despite being more difficult for lagging regions, are very helpful for them because they offer the opportunity to upgrade technologically and overcome technological deficits, as shown empirically by Barzotto et al. (2019). Interregional cooperation is also shown to be important by Santoalha (2019) who, however, with an analysis of the period prior to the Smart Specialisation, highlights that interregional cooperation and intra-regional cooperation should be both present and work synergically.

2.5 Governance and capabilities as enabling factors

In one of the first contributions to the Smart Specialisation literature, Rodríguez-Pose et al. (2014) identify the key role of institutional quality for the implementation of S3 strategies. Their analysis uses data prior to the actual implementation of Smart Specialisation to show that the quality of government is an important determinant of patenting at regional level, as well as the filter that represents the social and structural conditions which influence the ability of regions to generate new knowledge (Rodríguez-Pose, 1999).

Trippl et al. (2020) perform a systemic analysis of the governance of the Smart Specialisation policies in three types of regions according to the development scale: advanced, intermediate and lagging. The implementation of S3 brings challenges to all regions, although different ones. A reassuring message coming from this analysis, however, is that S3 in lagging regions support policy learning and system-building efforts, while in more advanced regions, they facilitate policy re-orientation and system transformation.

A recent, comprehensive assessment exists for those actions by which the European Commission supported the development and implementation of Smart Specialisation strategies (CSIL, 2019); this is based on different types of consultation with the stakeholders involved in the process and on the five traditional evaluation criteria of relevance, effectiveness, efficiency, coherence, and EU value added. What emerges is a differentiated capability of regions to implement S3: some regions returned to the old way of doing things after the European Commission support services ended; all regions benefited by customised support until it was available, but learning processes were differentiated. This shows the importance of policy learning and the usefulness of accompanying regions in all phases of the process.

One of the few papers which is able to address the implementation phase of the policy is the one by Papamichail et al. (2019) who analyse through interviews the case of two lagging Greek regions in order to find which difficulties arose in the implementation of Smart Specialisation strategies. Their findings point to the issue of capacity building in local stakeholders and potential beneficiaries of funding, as the implementation of S3 was made more difficult due to the limited ability of regional firms to use university-generated knowledge, which is too abstract for them, and limited ability to build strategic networks.

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From this review, it is clear that analyses of the actual implementation of S3 “on the ground” are still scant. Most existing works focus rather on design (priority setting, functioning of the entrepreneurial process of discovery, governance challenges), than on proper implementation (policy measures actuated), and the results are not fully conclusive. This urged us to dig deeper into the proper policy implementation, expanding on previous works (Gianelle et al., 2017, 2018, 2020), and seeking to provide an analysis strongly rooted in tangible policy measures.

Having in mind how local institutions and capabilities can influence governance settings and policy process, hence taking as a starting point the heterogeneity of the territorial contexts in which the policy is to be implemented, we centre our analysis on how much and how the policy measures implemented so far under the 2014-2020 Cohesion policy financial cycle incorporate and reflect some key principles of Smart Specialisation, in particular the selectivity of the intervention and the collaborative aspect.

This type of analysis is most needed in order to understand the true shape the policy has taken in Europe, and it should be seen as a necessary preliminary step to policy evaluation studies. This is even more urgent in a time when the policy maker community is starting taking stock of the Smart Specialisation experience in order to complete the design of innovation policy for the 2021-2027 financial period. A sound evidence-based assessment of how Smart Specialisation has been translated from concept to practice is also needed in order to contribute with facts to the scholarly debate, where the Smart Specialisation approach has been recently the object of critiques spanning from the very definition of the concept to the way in which it has been applied in practice (Hassink & Gong, 2019; Foray, 2019).

3. Methodology

In order to understand how the Smart Specialisation policy has been implemented in practice, the first step is to define a set a characteristics that policy intervention should have in order to translate into practice the rationale and principles of the policy approach. In the following paragraphs, building on the relevant literature and on previous work (Gianelle et al., 2017, 2018, 2020), we first introduce three main design principles of the Smart Specialisation implementation measures. Next, we translate those principles into three research hypotheses that can be empirically tested. Finally, we highlight several additional dimensions of the analysis that contribute to a better understanding of the evidence on Smart Specialisation implementation.

3.1 Design principles of Smart Specialisation intervention

We expect Smart Specialisation intervention to follow and reflect three main design principles.

PRINCIPLE 1: Be selective and customised

Compared with traditional industrial policy, Smart Specialisation exhibits two distinctive features (Foray, 2015; Radosevic, 2017). First, public intervention is selective or focused on particular economic activities. Horizontal or sectoral policies could complement, but do not represent a direct means to implement the Smart Specialisation policy ([1]). Second, the identification of candidate activities for intervention is the result of an entrepreneurial discovery process by which the entrepreneurs invest in the discovery of new goods and services to bring to the market, and the policy makers interact with them to evaluate emerging opportunities in terms of socio-economic benefits, risks and policy needs (Foray, 2015; Foray & Goenaga, 2013).

To **adopt a selective intervention logic** implies discriminating across activities and granting support only to those that are new to the local economy and have the potential for generating agglomeration dynamics and driving the diversification of the economy. During the last two decades, this approach has been mainstreamed in development economics, especially in the so-called New Industrial Policy (Hausmann & Rodrik, 2003, 2006; Rodrik, 2007) which was the basis for the elaboration of the Smart Specialisation concept (Foray & van Ark, 2007; Foray, David, & Hall, 2009; Radosevic, 2017).

In the Smart Specialisation literature, the economic activities designated as policy targets are usually referred to as *priorities* or *priority areas*. According to Foray (2015, p. 6): "Smart Specialisation policy requires "setting priorities – not horizontal priorities such as improving human capital, developing good universities or building an effective intellectual property rights system – but vertical ones regarding particular fields and technologies as well as particular sets or networks of actors.".

The externalities that motivate policy intervention according to the Smart Specialisation logic can differ substantially depending on the nature of the technological, productive, socio-economic relationships characterising the new activities the policy is meant to support. The inherent aim of industrial policy is therefore to put in place the customised support each new activity would require. Hence, the policy strategy should **vary the means and modes of intervention across priorities**. For instance, subsidies for public–private research collaborations in an emerging biomedical cluster, envisaged to develop prosthetic solutions for people with limited mobility are, of course, different from the managerial advice and seed capital needed to support start-ups aimed at enhancing cultural heritage for tourist activities through the use of digital applications.

([1]) Foray's (2015) own words are telling in this respect: "This is the main idea: having this vertical policy schema in addition to the horizontal programmes in order to enable a region to diversify by the development and consolidation of new specialities or new activities that will facilitate the transformation, revival and renewal of productive structures and generate spillovers towards the rest of the local economy'; and: 'The change of logic – from horizontal to vertical – can be justified almost negatively by the incapacity of recent horizontal policies to shift a large number of regions into the knowledge economy." (p. 35).

PRINCIPLE 2: Favour the establishment of a critical mass of entrepreneurial initiatives in emerging activities

The ultimate aim of policy measures aimed at fostering diversification of the economic fabric is the establishment of a new production cluster (Foray, 2015). In order for this to happen, and for a territory to be able to grasp the full potential embedded into its institutions, businesses, and research organisations, policy measures may **encourage collaboration** among innovation actors, in this way fostering cross-fertilisation, creating synergies and scale economies, and ultimately increasing the potential scope of entrepreneurial discovery.

Moreover, the policy may need to **facilitate firm entry into emerging activities**, after a first round of (exploratory) projects has been financed and realised. This can be achieved for instance by conditioning funding in the exploratory phase to result disclosure at the end of the project through defined mechanisms (e.g. publications or workshops).

PRINCIPLE 3: Support stakeholder communities

The entrepreneurial process of discovery is a crucial and defining feature of Smart Specialisation. According to Foray (2015, p. 24) "this process is the essential phase, the decisive link that allows the system to reorient and renew itself. Indeed, the entrepreneurial discovery that drives the process of smart specialisation is not simply the advent of an innovation but the deployment and variation of innovative ideas in a specialised area that generate knowledge about the future economic value of a possible direction of change".

An effective entrepreneurial discovery process requires developing a sustained (and costly) interaction between the policy makers and the private sector, starting with the strategy design phase and continuing during the implementation, monitoring, and evaluation of policy measures. It also requires a degree of coordination within the private sector, and more in general among the various stakeholders of the policy, in order to better channel the relevant information to the policy-maker level and vice versa.

Smart Specialisation should **promote the organization and strengthening of stakeholder communities**, structured especially according to the Smart Specialisation priority areas of intervention, in function both of abating the transaction costs of the interaction with the policy-making level, streamlining the process, and of improving information exchange, mutual knowledge and potential cross-fertilisation among the actors of the innovation ecosystem, guaranteeing better access to policy-relevant information to stakeholders.

3.2 Research hypotheses

We aim to assess how much the abovementioned principles are explicitly applied to policy intervention measures. Our main research question is therefore:

To what extent and how do the policy measures formally implementing the Smart Specialisation strategies reflect in practice the expected design principles of Smart Specialisation intervention?

In order to provide an answer to that question, we consider the incentive schemes and the associated legal devices (e.g. calls for projects/proposals) used by the public administrations to implement the Smart Specialisation policy, i.e. to channel funding to projects and actors.

In order to operationalise the research question and assess empirically each of the abovementioned principles, we formulated the following **three hypotheses to test** each of which is further divided into two empirically testable elements:

H1. S3 is a selective policy (PRINCIPLE 1):

H1a. It concentrates resources only on certain investment areas (priorities).

H1b. It provides tailor-made support to tackle the specific needs / market failures of the identified investment areas.

H2. S3 promotes individual and collaborative entrepreneurial initiatives in identified investment areas (PRINCIPLE 2):

H2a. It supports collaborative projects.

H2b. It facilitates firm entry in new areas through disclosure of results of subsidized projects.

H3. S3 promotes the organization and strengthening of stakeholder communities (PRINCIPLE 3):

H3a. It favours the creation of stakeholder associations/communities around the S3 areas.

H3b. It supports business/research support organisations.

3.3 Assessment of the research hypotheses

H1a: We look at whether calls for projects are aligned to the S3 priorities stated in the Smart Specialisation strategies. We consider a call to be aligned to S3 priorities when "falling into or being consistent with S3 priority areas" represents either an eligibility condition for applications, or a preferential criterion for the evaluation and selection of proposed projects. The first type of alignment mechanism is more stringent, as any proposal not explicitly related to an S3 priority area is not considered further. The S3 eligibility condition can be of two types: *formal*, when the applicants can be classified as belonging or not to S3 priority areas based on their main activity, according to an explicit taxonomy that in this case must be included in the strategy documents; or *substantial*, when it is the specific content of the proposal or project presented by the applicants to be evaluated by a committee as belonging to or being aligned with an S3 priority area. The preferential evaluation criterion is a less rigorous alignment mechanism, as proposals not related to S3 areas are eligible and evaluated, but do not benefit from preferential treatment (e.g. priority in access to available funding). The two alignment mechanisms can also be both present in the same call; in that case, not only a project needs to fall into or be consistent with a priority area of investment, but its potential contribution to that area is also evaluated and rated.

H1b: We look at how many S3 priorities are addressed by the same call. A call that addresses all priorities at once would exhibit little customisation, inasmuch as it applies the same instruments, addresses the same type of beneficiaries, with the same type of projects across different economic areas. On the contrary, a call addressing only one or two priorities at once would exhibit a high degree of customisation.

H2a: We look at the type of beneficiaries supported by the calls. In particular, we look at whether the calls solely address consortia of businesses and/or research organisations, or whether consortia are among the eligible subjects. We consider four types of consortia, depending on whether they are constituted only of firms, research organisations, firms and research organisations, or other mixed type of subjects.

H2b: We look at whether calls provide for special mechanisms that facilitate subsequent entry into emerging activities. This is in order to understand whether the calls support the building up of a critical mass of entrepreneurial initiatives beyond those directly subsidised. Operationally, we search

for beneficiary obligations regarding project result disclosure and project reporting to subjects different from the administration.

H3a: We look at whether administrations use calls to establish stakeholder associations/communities around the S3 priority areas. The emergence and establishment of such associations may be the main purpose of the calls, or be a subordinate objective of e.g. an incentive scheme aimed to support research projects. We consider only stakeholder associations formally established, whose membership can be tracked. Note that the membership of a stakeholder association is by definition different from that of a consortium of beneficiaries: the former should include all beneficiaries of a call (and possibly of subsequent calls of the same type, or even other subjects), whether single organisations or consortia.

H3b: We finally look at whether calls address specific business-support organisations, networks, or platforms. Those organisations have an important role as intermediaries or information brokers between the policy-maker level and the socio-economic actors on the ground; in this sense, they contribute to the organisation of the innovation ecosystem and constitute a natural communication channel between the private sector and the administration.

3.4 Other relevant dimensions for the analysis

In order to have a better picture of how Smart Specialisation has been implemented across the EU, and to help put into context the analyses aimed to verify the three main research hypotheses mentioned above, there are several additional dimensions along which the evidence from project calls should be examined.

First of all, it is important to consider the **territorial scale** at which Smart Specialisation strategies are implemented, whether national or regional, and, even more important, the **level of development** of the different territories. Compared to more developed regions, less developed ones face different socio-economic challenges, may have a poorer innovation ecosystem and limited tradition of stakeholder relationships (Trippl et al., 2020). Moreover, they have a greater amount of EU funds available for innovation policy and face absorption problems. All such characteristics may affect the choice of policy instruments and collaborative schemes, the type of beneficiaries to address, and more in general the design of calls. It is therefore important trying to unpack aggregate patterns according to the different trends different types of territories may exhibit.

A second important element to consider is whether the calls exhibit an **experimental design** that is whether they introduce novel elements in the long-standing policy-making practice of European regions and countries in the context of Cohesion policy. We must bear in mind that Smart Specialisation was incorporated in the European Cohesion policy and, although representing itself a reform of Cohesion policy, it adapted to pre-existing rules and a plurennial practice in most EU territories. As discussed in Section 2, the Smart Specialisation experience is often characterised by path-dependence on previous policy experiences and traditions (Aranguren et al., 2019). For this reason, it is important to single out the policy measures that break with the past by introducing new elements in a given territory, regarding for example the specific nature of the projects and their governance, the composition of beneficiaries, the involvement of other public organisations, a specific territorial focus of the call, the funding scheme and selection procedure, the project monitoring mechanisms, or other special requirements.

Finally, it is also interesting to look at the **financial size of the interventions** actuated through calls for projects and examine how the size of interventions correlates with other characteristics of the calls and territories and how it evolves over time.

The abovementioned dimensions are variously used in the analyses presented in section 5. Annex 1 contains the analytical taxonomies we used to classify instruments and beneficiaries.

4. Data

The basic units of analysis considered in this study are the calls for projects implementing the S3 strategies. The analysis covers the calls published in 23 different territories in eight different EU countries by (i) five national authorities (Spain, Poland, Slovenia, Finland, Hungary), and (ii) 17 regional authorities in six countries (North-Rhine Westphalia [DE]; Catalonia, Valencian Community and Galicia [ES]; Ostrobothnia, Lapland and Helsinki-Usimaa [FI]; Emilia Romagna, Abruzzo, Lombardy, Tuscany and Campania [IT]; Upper Norrland and West Sweden [SE]; Lubelskie, Slaskie and Masowieckie [PL]). Considering the diverse involvement of European countries and regions in the Smart Specialisation policy, the geographical distribution of the sample (i.e. the inclusion of territories on both sides of the Eastern-Western and Northern-Southern divides), the presence of different administrative levels (national and regional), together with the mix of territories with different degrees of development and different innovation performance, guarantee in our view a balanced representation of the actual implementation of the Smart Specialisation policy across the EU. The main characteristics of the territorial entities included in the database are reported in Table 1.

According to European Commission's data on finances implemented ([2]), the territorial entities considered in this study altogether have more than 12 billion euros of EU resources assigned to ERDF-TO1 (18 billion euros considering both EU and national resources), equal to 29% of the total ERDF-TO1 budget available for the entire EU ([3]). Those figures confirm the rather broad coverage of the database in terms of the scope of ERDF-TO1. In terms of policy implementation, over the period January 2014 – June 2020, the sample exhibits an average of financial resources allocated to selected projects (i.e. the declared eligible costs) equal to 97% of the total resources available under ERDF-TO1. Whereas the actual expenditure reported by selected projects (the declared eligible spending) in the same period equals 41% of the total resources available, spanning from a minimum of 10% in Catalonia to a maximum of 77% in Tuscany. Those data confirm a rather advanced stage of policy implementation, although with considerable variation across countries and regions.

Our database includes a total of 537 calls giving access to public funding schemes which are co-financed by ERDF-TO1 resources through national and regional OPs or, in a few cases, which are entirely financed by national resources and are directly linked to the implementation of the S3 strategies. We included calls published between 2014 and mid-2020; calls that were still open beyond that period were also considered. To our knowledge, **the database comprises the totality of the ERDF-TO1 calls published up to mid-2020 under ERDF-TO1 in the countries and regions covered in the analysis**.

Data collection was outsourced to 10 national experts who searched for and analysed the calls under the authors' guidance; this process took place between June and September 2020. The calls were then examined by the authors and systematically checked for consistency and correctness of the information provided also through further interaction with the experts.

As far as Poland and Italy are concerned, the data collection process largely benefited by the existence of well-organised, on-line national and regional call repositories, easily accessible and navigable, within the dedicated OPs websites. Information accessibility and availability meet high standards in Hungary and Slovenia as well. Whereas in other countries like for instance Spain and Sweden, information on the calls is not systematically collected in national and regional repositories and access requires more burdensome search through official administrative documents and/or direct interaction with the managing authorities of the ERDF Operational Programmes.

([2]) Information extracted from the portal https://cohesiondata.ec.europa.eu/, reporting data updated in June 2020.

([3]) Note that Finland is excluded from this computation as the resources assigned to Smart Specialisation there fall under "multi thematic priority axes" (investment envelopes) within the national ERDF Operational Programme. At aggregate level, under the Research & Innovation theme, European Commission data on "finances implemented" report values related to around 91% of the planned amount; the remaining planned amounts are reported under multi thematic priority axes.

Table 1. Territorial entities included in the empirical sample

N.	Name	Administrative level	Degree of development (regions only) (*)	European innovation scoreboard 2020 (for countries) Regional innovation scoreboard 2019 (for regions)
1	North-Rhine Westphalia (DE)	Regional	More developed	Strong innovator
2	Spain	National		Moderate innovator
3	Valencian Community (ES)	Regional	More developed	Moderate innovator
4	Catalonia (ES)	Regional	More developed	Moderate innovator
5	Galicia (ES)	Regional	More developed	Moderate innovator
6	Finland	National		Innovation leader
7	Ostrobothnia (FI)	Regional	More developed	Innovation leader
8	Lapland (FI)	Regional	More developed	Strong innovator
9	Helsinki-Usimaa (FI)	Regional	More developed	Innovation leader
10	Central Hungary	National	More developed	Moderate innovator
11	Hungary except Central H.	National	Less developed	Moderate innovator
12	Emilia Romagna (IT)	Regional	More developed	Moderate innovator
13	Abruzzo (IT)	Regional	Transition	Moderate innovator
14	Tuscany (IT)	Regional	More developed	Moderate innovator
15	Lombardy (IT)	Regional	More developed	Moderate innovator
16	Campania (IT)	Regional	Less developed	Moderate innovator
17	Poland	National		Moderate innovator
18	Lubelskie (PL)	Regional	Less developed	Modest innovator
19	Slaskie (PL)	Regional	Less developed	Moderate innovator
20	Masowieckie (PL)	Regional	Transition	Modest innovator
21	Upper Norrland (SE)	Regional	More developed	Strong innovator
22	West Sweden (SE)	Regional	More developed	Innovation leader
23	Slovenia	National		Moderate innovator

(*) European Structural and Investment Funds 2014-2020 classification.

For each call, the following main information was recorded: (i) name and classification of the region or, alternatively, name of the national OP; (ii) description of the aim of the call; (iii) publication date; (iv) overall public funding provided through the call (EU contribution and national co-financing); (v) type(s) of policy instruments; (vi) type(s) of beneficiaries; (vii) the number of S3 priority areas addressed; (viii) the criteria used to verify the alignment with S3 priorities; (ix) special requirements (reporting, result disclosure, beneficiary association), (x) experimental design.

Where applicable, and only when documents were available, we considered all changes which occurred in the calls' design and process (call revisions, amendments, etc.), and we classified the relevant information for the analysis on the basis of the integrations and modifications to the original document. In a few cases, where a call's budget was increased after the first publication, and when the administrative process was traceable and the necessary information available, we modified the initial amount of public funding in order to consider additional funding made available through the same call to finance more projects.

5. Results

5.1 Overview of S3 implementation measures

Instruments used depend on the type of territories

The starting point of the analysis is to look at the instruments implemented in the various territories.

According to the instrument categorisation we adopted in this study (see table A1 in Annex 1), it appears that the instruments used are overall quite traditional (Table 2). In about two thirds of the cases, the instrument used is "Support to RTD&I projects"; in slightly more than 13% of cases, the instrument is "Innovation support services"; in 8% of the cases "Support to research infrastructure"; and in 6% of the cases "Support to business support organisations, innovation networks and platforms". A lesser role has been played by "Support to innovative SMEs creation and strengthening".

Less traditional instruments have been seldom used. In particular, there is only one call with "Innovation prizes" and only eight calls (1.5% of the total) which are concerned with "Public procurement for R&D and innovation".

The distribution of instruments may be related to the type of regions which are implementing them. This is verified as shown in Table 2. The most relevant difference is the fact that "Support to business support organisations, innovation networks and platforms" as an instrument is only present in more developed regions.

On the other hand, "Support to research infrastructure" is more diffused in less developed regions, while "Innovation support services" are more diffused in less developed regions and transition ones. The latter are horizontal instruments, which are expected to improve the local context in which Smart Specialisation is implemented. These instruments generally have single beneficiaries, not consortia, so they are more accessible and less complex. They are comparatively simpler instruments that do not require high specific expertise on the beneficiary side.

In general, it is therefore possible to observe that regions and countries apply a limited portfolio of instruments and basically the traditional ones. The most innovative instruments are seldom applied, and only in territories with higher levels of development which are also expected to have higher administrative capabilities.

One interesting observation is that, indeed, all instruments which are applied are still supply-side ones, while demand-side ones are represented only by the eight calls on "Public procurement for R&D and innovation".

There seems to be a tendency to continue to use the same types of instruments which were used in the past, possibly with some new ways of writing the calls in order to make them compliant with the S3 approach. On the other hand, it is also possible that some of the traditional instruments have been rethought to keep them in line with the principles of S3. Knowing which of the two cases is really prevailing will require qualitative testing, although some quantitative hint in this direction will stem from the analysis of experimental design instruments which is presented later.

Knowing that some regions and countries issued calls which are multi-instrument and multi-TO (for example regions in Sweden), it is important to be sure that this is not driving the results. The second part of Table 2 therefore reproduces the same analysis excluding the multi-TO and multi-instrument calls. The results are confirmed, since similar percentages are obtained. The only difference which may be significant is the one related to the use of "Support to business support organisations, innovation networks and platforms" in more developed regions, which is now less common, but still takes place only there.

Table 2. Instruments used in the calls, by type of territory

Instrument (all calls)	1. Less developed regions	2. Transition regions	3. More developed regions	4. National Programmes	Total
1. Support to RTD&I projects	28 (57.1%)	15 (68.2%)	148 (61.2%)	165 (74%)	356 (66.4%)
2. Support to innovative SMEs creation and strengthening	1 (2%)	-	11 (4.5%)	6 (2.7%)	18 (3.4%)
3. Innovation support services	13 (26.5%)	3 (13.6%)	25 (10.3%)	30 (13.5%)	71 (13.2%)
4. Public procurement for R&D and innovation	1 (2%)	-	6 (2.5%)	1 (0.4%)	8 (1.5%)
5. Innovation prizes	-	-	1 (0.4%)	-	1 (0.2%)
6. Support to research infrastructures	6 (12.2%)	4 (18.2%)	15 (6.2%)	19 (8.5%)	44 (8.2%)
7. Support to business support organisations, innovation networks and platforms	-	-	34 (14%)	1 (0.4%)	35 (6.5%)
8. Other	-	-	2 (0.8%)	1 (0.4%)	3 (0.6%)
Total	49 (100%)	22 (100%)	242 (100%)	223 (100%)	536 (100%)

Instrument (excluding multi-TO and multi-instrument)	1. Less developed regions	2. Transition regions	3. More developed regions	4. National Programmes	Total
1. Support to RTD&I projects	26 (55.3%)	14 (66.7%)	123 (66.5%)	163 (73.8%)	326 (68.8%)
2. Support to innovative SMEs creation and strengthening	1 (2.1%)	-	7 (3.8%)	6 (2.7%)	14 (3%)
3. Innovation support services	13 (27.7%)	3 (14.3%)	21 (11.4%)	30 (13.6%)	67 (14.1%)
4. Public procurement for R&D and innovation	1 (2.1%)	-	6 (3.2%)	1 (0.5%)	8 (1.7%)
5. Innovation prizes	-	-	1 (0.5%)	-	1 (0.2%)
6. Support to research infrastructures	6 (12.8%)	4 (19%)	15 (8.1%)	19 (8.6%)	44 (9.3%)
7. Support to business support organisations, innovation networks and platforms	-	-	12 (6.5%)	1 (0.5%)	13 (2.7%)
8. Other	-	-	-	1 (0.5%)	1 (0.2%)
Total	47 (100%)	21 (100%)	185 (100%)	221 (100%)	474 (100%)

Experimental design calls: Are they differently distributed or do they use different instruments?

Calls with experimental design (i.e. exhibiting novel elements compared to the past experience in the same territories) may be different from the others. The experts who carried out the data collection had to signal their presence through an appropriate dummy variable. This allows testing the distribution of experimental design calls among the different types of territories and the distribution of instruments in experimental design calls with respect to the others.

For what concerns the different types of territories, the results are presented in Figure 1. Experimental design calls represent 38% of total sample calls. Experimental design calls are significantly more diffused among national programmes than regional ones. It seems that regions have been more conservative with their calls, while national bodies have been keener on trying new avenues.

Figure 1. Experimental design calls, by type of territory

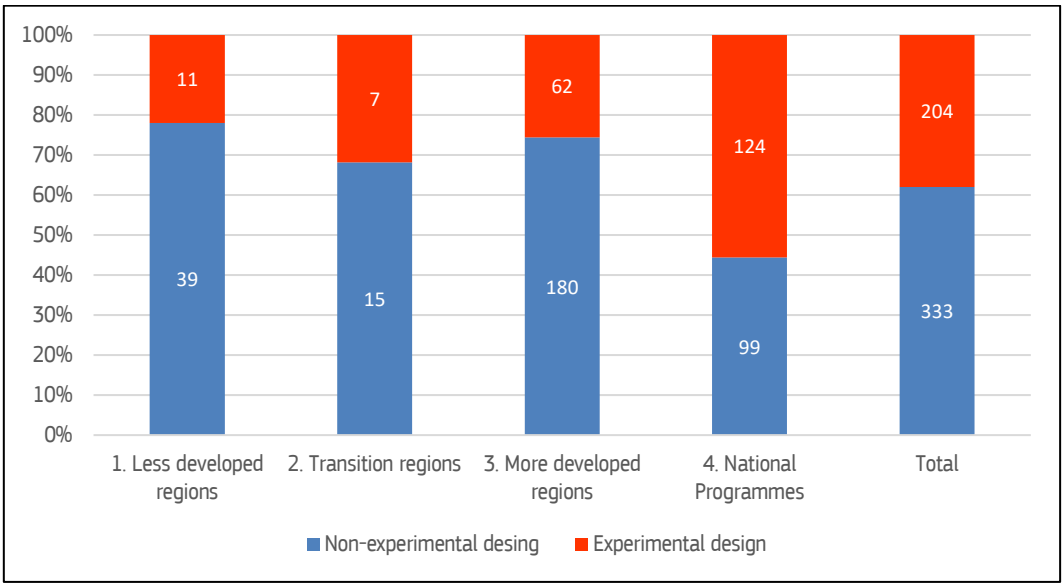


Table 3 tests whether experimental design calls tend to use different instruments. This is shown to be the case, since almost all calls with experimental design use as instrument "Support to RTD&I projects". This was already the most diffused instrument overall and still represents more than half of the non-experimental calls, but it reaches almost 85% in experimental design calls.

Experimental design calls are less concerned with horizontal instruments. The other interesting difference concerns demand-side instruments, more specifically "Public procurement for R&D and innovation", which is seldom used overall and normally only in experimental design calls. This was expected, since these are among the least traditional instruments, which should be more diffused among experimental calls, even if these cases are in reality very rare.

Table 3. Instruments used in experimental design calls

Instrument	**Non-experimental design**	**Experimental design**
1. Support to RTD&I projects	183 (55.1%)	173 (84.8%)
2. Support to innovative SMEs creation and strengthening	14 (4.2%)	4 (2%)
3. Innovation support services	62 (18.7%)	9 (4.4%)
4. Public procurement for R&D and innovation	2 (0.6%)	6 (2.9%)
5. Innovation prizes	1 (0.3%)	0 (0%)
6. Support to research infrastructures	37 (11.1%)	7 (3.4%)
7. Support to business support organisations, innovation networks and platforms	33 (9.9%)	2 (1%)
8. Other	-	3 (1.5%)
Total (column)	332 (100%)	204 (100%)

The financial amounts: Which calls are larger?

Another interesting preliminary analysis is the one concerning the size of the calls in terms of funds allocated. The dataset, in fact, contains the variables which allow for the measurement of this dimension, in terms of the amount of EU contribution and of the total amount of funds available for TO1, which allows to calculate the percentage of the funds which are invested on a single call.

The analysis which is presented in Table 4 is a multivariate one, even if not a causal one, which allows to see whether there is a correlation between the relative size of a call and some of the characteristics of the call, once considering other characteristics at the same time ([4]).

Since the territories under scrutiny differ under many aspects, including the amount of total ERDF-TO1 funds available ([5]), territorial dummies are inserted in all regressions to test for possible heterogeneity.

The first two models include all variables, but differ because in the first case the presence of each type of beneficiary is included, while in the second one the presence of collaborations (which depend on beneficiaries, as it will be shown in what follows) is included. Having both together would not make sense as one variable is built on the other.

The first characteristic which is tested is the date of publication of the call. This has a negative correlation with the call size, meaning that the first calls were, *ceteris paribus*, larger. This might be due to the fact that the policymakers needed to start spending fast to avoid losing resources at the end of the programming period.

Experimental design calls tend, on the contrary, to be smaller, even if this is significant only when controlling for other factors at the same time. This is also expected, since normally experiments are not pursued on large scale.

In terms of policy instruments, the benchmark is represented by "Support to RTD&I projects", which is by far the most diffused instrument, as seen before. With respect to this instrument, calls using the other instruments tend to be smaller. In particular, negative and significant coefficients are present for "Support to innovative SMEs creation and strengthening", "Innovation support services", "Public procurement for R&D and innovation", "Innovation prizes" and "Support to business support organisations, innovation networks and platforms".

Calls on infrastructure are instead not significantly smaller, and this is plausible because investments in infrastructure tend to be rather large. Besides it has to be remembered that the dataset only includes competitive calls, so investments in research infrastructure are sometimes out of our analysis because they may be realised through non-competitive processes (e.g. negotiation procedures).

In terms of beneficiaries, there will be a specific analysis later on, but these regressions already include a series of dummies for the presence of a certain type of beneficiary in the calls. Since calls may have more than one type of beneficiary, these dummies are not mutually exclusive and their coefficients can be estimated together. The results, in this case, are not completely stable to the inclusion of other variables, but at least some results are consistent. For instance, calls supporting start-ups and spin-offs are normally smaller.

If we look at calls supporting collaborative projects, "Pure collaborations calls", i.e. those calls which only include consortia as beneficiaries, are normally larger. This may depend on the fact that consortia need larger budgets than those of single beneficiaries but also on the fact that the legislator wanted to put more resources on those projects, or a combination of the two.

Finally, in order to have an idea of how focused are the calls, the size is related to the number of priorities, the benchmark being calls addressing all S3 priorities. With respect to these calls, calls which address just one or two priority tend to be significantly smaller, and smaller are also calls which address no S3 priority (later on, it will be shown that these calls are normally not aligned with S3).

([4]) The results which are presented come from a simple OLS regression with robust standard errors and independent variables inserted by blocks.

([5]) This possible issue is also corrected by making the size of the call variable a relative one.

Table 4. Characteristics of calls related to their size in financial terms

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Publication date	-0.000***	-0.000***	-0.000***					
	(0.000)	(0.000)	(0.000)					
Experimental design	-0.013*	-0.016**		-0.003				
	(0.008)	(0.007)		(0.006)				
Type of policy instrument								
2. Support to innovative	-0.043***	-0.040***			-0.038***			
	(0.011)	(0.012)			(0.012)			
3. Innovation support	-0.034***	-0.039***			-0.038***			
	(0.008)	(0.007)			(0.006)			
4. Public procurement for	-0.027*	-0.039***			-0.023*			
	(0.016)	(0.015)			(0.013)			
5. Innovation prizes	-0.045*	-0.070***			-0.071***			
	(0.023)	(0.014)			(0.013)			
6. Support to research	0.004	-0.003			0.007			
	(0.008)	(0.009)			(0.011)			
7. Support to business	-0.043***	-0.045***			-0.048***			
	(0.015)	(0.014)			(0.013)			
8. Other:	0.048**	0.026**			0.018			
	(0.020)	(0.010)			(0.019)			
Beneficiaries								
1. SMEs	-0.007					-0.009#		
	(0.006)					(0.006)		
2. Start-ups and spin-offs	-0.031**					-0.030**		
	(0.013)					(0.014)		
3. Large enterprises	0.004					0.016*		
	(0.009)					(0.009)		
4. Enterprises (large and	-0.008					0.003		
	(0.010)					(0.010)		
5. Research organisations	-0.012#					-0.010		
	(0.008)					(0.008)		
6. Consortia of research	-0.002					0.013#		
	(0.010)					(0.010)		
7. Consortia of enterprises	0.010#					0.013**		
	(0.007)					(0.007)		
8. Consortia of enterprises	0.011					0.011		
	(0.009)					(0.010)		
9. Other consortia with	-0.034**					-0.040**		
	(0.016)					(0.017)		
10. Business support	-0.010					-0.029***		
	(0.010)					(0.011)		
11. Open-innovation	0.020#					-0.000		
	(0.013)					(0.014)		
12. Financial institutions	0.055**					0.025		
	(0.022)					(0.019)		
13. Public administrations	-0.018					-0.009		
	(0.016)					(0.016)		
14. Third sector	-0.018					-0.017		
	(0.019)					(0.025)		
15. Other	0.006					-0.003		
	(0.018)					(0.018)		
Pure collaborations		0.015*					0.025***	
		(0.008)					(0.008)	
Other collaborations		0.006					0.019***	
		(0.006)					(0.005)	
S3 priorities								
1. All (BENCHMARK)								
2. One or two	-0.020#	-0.021#						-0.024*
	(0.014)	(0.013)						(0.012)
3. More than two	-0.041#	-0.044#						-0.026
	(0.028)	(0.029)						(0.027)
4. None	-0.019**	-0.012#						-0.025***
	(0.009)	(0.008)						(0.007)
Regional dummies	Included	Included	Included	Included	Included	Included	Included	Included
Constant	0.889***	0.768***	0.730***	0.012**	0.009***	0.042#	0.009***	0.026**
	(0.175)	(0.171)	(0.176)	(0.006)	(0.002)	(0.027)	(0.002)	(0.011)
Observations	489	489	490	501	500	501	501	501
R-squared	0.495	0.470	0.381	0.340	0.407	0.397	0.365	0.354
N	489	489	490	501	500	501	501	501
F	.	.	10.46	20.06	.	13.01	19.03	18.14

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.10, # p<0.2

5.2 Testing the research hypotheses

5.2.1 How do calls align with the Smart Specialisation priorities? (Hypothesis 1a)

As discussed in section 3, the first thing to check is whether the examined calls are aligned with the priorities set by the Smart Specialisation strategies. This can be observed in the dataset through three different characteristics of the calls.

The first one is whether the call has a formal eligibility mechanism to guarantee that projects contribute to or fall into S3 priorities. As it can be observed in Table 5, this is very rarely the case because only a very tiny fraction of calls has explicitly this specific requirement.

However, as shown in the second subset of columns in Table 5, a large majority of calls, around 80% include a substantial eligibility clause, the second indicator.

The third indicator of alignment with Smart Specialisation strategies concerns the type of evaluation. This looks at weather in the call there is a preferential evaluation clause and, in this case, only slightly more than one quarter of the examined calls exhibit this feature. It has however to be remarked that when calls already have a substantial eligibility clause, they do not necessarily need an S3 preferential evaluation criterion.

The type of region in which calls were deployed, only seems to have a small impact on the alignment with Smart Specialisation.

Substantial S3 eligibility, as Table 5 shows, is highly common and it is as such in all types of territories, with values over 75% everywhere. It is however interesting to observe that it is surprisingly lower for more developed regions.

Preferential S3 evaluation is happening only in a minority of cases, but it is very differently diffused among types of regions. Calls belonging to national programmes only require it in about 10% of cases, calls belonging to less developed regions in around one quarter of cases, calls belonging to more developed regions in more than 37% of cases. Interestingly, the highest value is found for transition regions, above 72%. Only two regions belong to this category in our sample, but both have a diffused use of this type of assessment. Abruzzo (IT) in all four calls it issued, Mazowieckie (PL) in 12 out of its 18 calls.

Table 5. Alignment to smart specialisation indicators by type of territory

	Formal S3 eligibility			**Substantial S3 eligibility**			**Preferential S3 evaluation**		
	No	**Yes**	**Total**	**No**	**Yes**	**Total**	**No**	**Yes**	**Total**
1. Less developed regions	50 (100%)	0 (0%)	50 (100%)	6 (12%)	44 (88%)	50 (100%)	37 (74%)	13 (26%)	50 (100%)
2. Transition regions	22 (100%)	0 (0%)	22 (100%)	3 (13.6%)	19 (86.4%)	22 (100%)	6 (27.3%)	16 (72.7%)	22 (100%)
3. More developed regions	234 (96.7%)	8 (3.3%)	242 (100%)	59 (24.4%)	183 (75.6%)	242 (100%)	151 (62.4%)	91 (37.6%)	242 (100%)
4. National Programmes	223 (100%)	0 (0%)	223 (100%)	39 (17.5%)	184 (82.5%)	223 (100%)	199 (89.2%)	24 (10.8%)	223 (100%)
Total	529 (98.5%)	8 (1.5%)	537 (100%)	107 (19.9%)	430 (80.1%)	537 (100%)	393 (73.2%)	144 (26.8%)	537 (100%)

At this point, it is useful to build a single indicator of alignment, which uses the information provided by the three individual indicators mentioned above. This classification is presented in Table 6.

As seen in Table 5, the formal eligibility for S3 is such a rare event that it can be neglected so the classification is based on substantial eligibility and preferential S3 evaluation.

The first type of calls is the one which has both substantial eligibility and a preferential evaluation. These calls are hence **aligned with preferential evaluation** and represent 116 calls, i.e. 21.6% of the total.

As mentioned already, when there are calls which have a substantial eligibility requirement, they do not necessarily need to also have any sort of preferential evaluation. For this reason, it is possible to consider as aligned with S3 also those calls which have substantial eligibility but no preferential evaluation. These calls, which are **aligned with no preferential evaluation** are the majority in the sample, amounting to 314 calls, 58.5% of the total.

These first two types of calls, both aligned with S3, represent slightly more than 80% of the sample.

There exist calls which have a preferential evaluation requirement, but do not have a substantial eligibility one. These calls are only weakly aligned with S3 and are quite rare. These **calls with preferential evaluation only**, represent a mere 5.2% of the sample, i.e. 28 calls in total.

Finally, there is a small but non-negligible fraction of calls which are **not aligned** with S3, since they do not have a substantial eligibility or a preferential evaluation requirement. There are 79 calls of this type, representing 14.7% of the total.

Quite surprisingly, it is therefore interesting to observe that, based on these definitions, there is a non-negligible share of calls which do not appear to be aligned.

Table 6. Classification of calls depending on the alignment with S3

		Preferential evaluation	
		Yes	**No**
Substantial eligibility	**Yes**	1. Aligned calls with preferential evaluation 116 calls 21.6 %	2. Aligned calls without preferential evaluation 314 calls 58.5 %
	No	3. Calls with preferential evaluation only 28 calls 5.2 %	4. Calls not aligned with S3 79 calls 14.7 %

Calls are very differently aligned in different places. In Table 7 the number of calls by country and region is presented separately, in absolute numbers and in percentage of the total, for each of the 23 territories covered in the analysis.

The case of Finland is the most virtuous, as in all four cases, including the Six-cities strategy which is interregional, all calls are aligned with preferential evaluation.

In Germany, there is only the case of North Rhine-Westphalia which, interestingly, has no call aligned with preferential evaluation, but the largest majority still have an alignment without it.

In Hungary, there are two cases, the programme for Central Hungary and the national programme for the rest of the country. The two programmes seem to work quite differently, since Central Hungary has a large share of aligned calls with preferential evaluation, but also a higher than average share of calls with no alignment. In the rest of Hungary, on the contrary, there are less aligned calls with preferential evaluation, around the sample average, but many aligned calls without preferential evaluation or calls with only preferential evaluation, so that the share of those with no alignment is small.

The case of Italy is also interesting, because in four out of five programmes there are no calls with preferential evaluation only, the exception being Toscana. In all programmes, however, the calls not aligned with S3 are maximum one, a tiny fraction of the total.

Poland has significant differences between the programmes. The national level, the one which issues most calls, has almost all calls aligned without preferential evaluation. Mazowieckie, belonging to the transition group, has most aligned calls with preferential evaluation but also a significant share of calls with no alignment at all. Lubelskie, belonging to the less developed group, has no calls which are not aligned, although alignment with and without preferential evaluation calls are as diffused as in the whole sample. Finally, Śląskie, also belonging to the less developed group, has almost all calls aligned without preferential evaluation, and a few with preferential evaluation only.

Slovenia as a country has a quite balanced distribution of calls, in which those with preferential evaluation only are as diffused as those aligned without preferential evaluation.

Spain is the country to which most calls which are not aligned belong. Not aligned calls are more than half in Catalonia, and 75% of those issued at national level. Also, in the Valencian Community, 30% of calls are not aligned. The exception to this trend is Galicia, where only one call is not aligned, one other only has a preferential evaluation, and the other calls are equally split between aligned with or without preferential evaluation.

The last country covered in the analysis is Sweden, which is represented by two regions, both belonging to the more developed group, but behaving very differently from each other: West Sweden has in fact a large majority of calls with no alignment, while Upper Norrland only has aligned calls with preferential evaluation.

Concluding this part, it has to be remarked that the alignment with S3 of calls is very variable, across countries and across regions within the same countries.

Table 7. Alignment with S3 for each territory analysed

Country	Region	1. Aligned calls with preferential evaluation	2. Aligned calls with no preferential evaluation	3. Calls with preferential evaluation only	4. Calls not aligned with S3	Total (row)
Finland	6Aika-Six Cities	7 (100%)	-	-	-	7 (100%)
Finland	Helsinki-Uusimaa	8 (100%)	-	-	-	8 (100%)
Finland	Lapland	12 (100%)	-	-	-	12 (100%)
Finland	Ostrobothnia	12 (100%)	-	-	-	12 (100%)
Germany	North Rhine-Westphalia	-	34 (85%)	2 (5%)	4 (10%)	40 (100%)
Hungary	Central Hungary	3 (50%)	1 (16.7%)	1 (16.7%)	1 (16.7%)	6 (100%)
Hungary	except Central Hungary	4 (22.2%)	9 (50%)	4 (22.2%)	1 (5.6%)	18 (100%)
Italy	Abruzzo	4 (100%)	-	-	-	4 (100%)
Italy	Campania	4 (33.3%)	7 (58.3%)	-	1 (8.3%)	12 (100%)
Italy	Emilia Romagna	9 (47.4%)	9 (47.4%)	-	1 (5.3%)	19 (100%)
Italy	Lombardia	2 (11.1%)	15 (83.3%)	-	1 (5.6%)	18 (100%)
Italy	Toscana	5 (19.2%)	17 (65.4%)	3 (11.5%)	1 (3.8%)	26 (100%)
Poland	Lubelskie	4 (21.1%)	11 (57.9%)	4 (21.1%)	-	19 (100%)
Poland	Mazowieckie	12 (66.7%)	3 (16.7%)	-	3 (16.7%)	18 (100%)
Poland	National level	-	149 (98.7%)	-	2 (1.3%)	151 (100%)
Poland	Śląskie	-	18 (94.7%)	1 (5.3%)	-	19 (100%)
Slovenia	Slovenia	3 (20%)	5 (33.3%)	5 (33.3%)	2 (13.3%)	15 (100%)
Spain	Catalonia	-	12 (41.4%)	-	17 (58.6%)	29 (100%)
Spain	Galicia	7 (41.2%)	8 (47.1%)	1 (5.9%)	1 (5.9%)	17 (100%)
Spain	Spain	-	7 (21.9%)	1 (3.1%)	24 (75%)	32 (100%)
Spain	Valencian Community	8 (24.2%)	9 (27.2%)	6 (18.2%)	10 (30.3%)	33 (100%)
Sweden	VästSverige (West Sweden)	2 (16.7%)	-	-	10 (83.3%)	12 (100%)
Sweden	Övre Norrland (Upper Norrland)	10 (100%)	-	-	-	10 (100%)
TOTAL		116 (21.6%)	314 (58.5%)	28 (5.2%)	79 (14.7%)	537 (100%)

The alignment with Smart Specialisation can also be different depending on whether the calls are using an experimental design.

Calls classified as experimental are overall more aligned than the average, although the share of those which also have preferential evaluation is lower than the average (Table 8); this apparent contradiction depends on the fact that experimental design calls have in most cases a substantial eligibility requirement and hence rarely need to have preferential types of evaluation.

Table 8. Alignment with S3 and experimental design

Type of Call	**1. Aligned calls with preferential evaluation**	**2. Aligned calls with no preferential evaluation**	**3. Calls with preferential evaluation only**	**4. Calls not aligned with S3**	**Total (row)**
Non-experimental design	95 (28.5%)	153 (45.9%)	19 (5.7%)	66 (19.8%)	333 (100%)
Experimental design	21 (10.3%)	161 (78.9%)	9 (4.4%)	13 (6.4%)	204 (100%)
Total	116 (21.6%)	314 (58.5%)	28 (5.2%)	79 (14.7%)	537 (100%)

5.2.2 Do calls address all priorities, a subset of priorities or single priorities? (Hypothesis 1b)

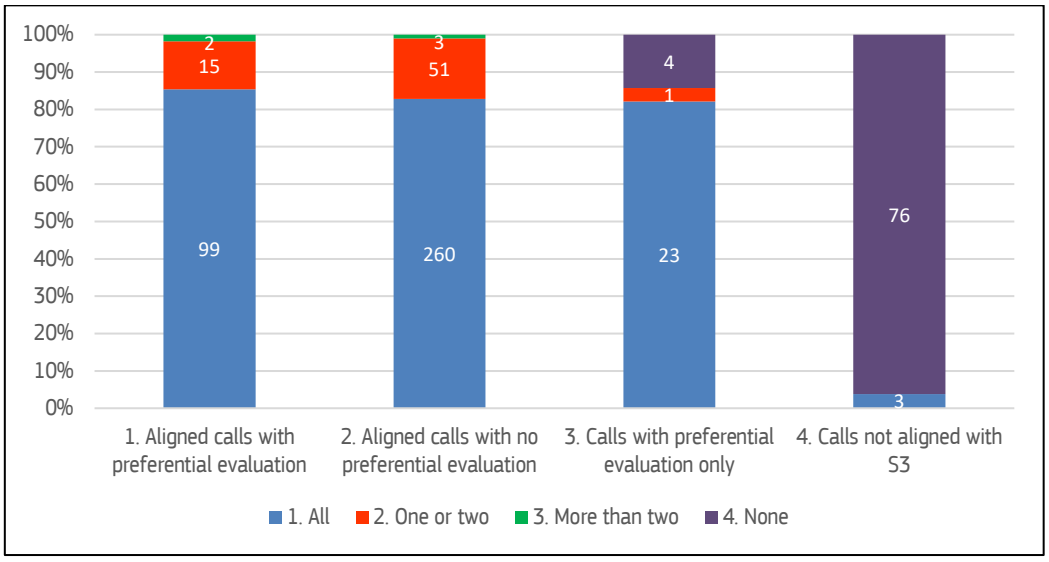
The sample allows classifying the calls according to whether they address all S3 priorities, only one or two, more than two, or, possibly, no priority at all (Figure 2).

A large majority of calls (385, representing 71.7% of the total) address all priorities at the same time; some calls address one or two priorities (67, 12.5% of the total); and almost no call (only 5, 0.9% of the total) address a subset made of more than two priorities. Interestingly, there is a significant share of calls (80, 14.9% of the total) which do not address any S3 priority and seem hence to be in practice little concerned with the strategy.

The calls not addressing any S3 priority are expected to have no alignment with S3. This is tested in Figure 2 and the results confirm the expectation very significantly. In particular, there are 76 calls which are not aligned with S3 (according to the classification presented in the previous sub-section) which also do not address any S3 priority. Only three calls are not aligned and yet address all priorities, and only four calls are weakly aligned with S3 and address no priority.

This demonstrates that, also according to this indicator, there is this group of calls, around 15%, which is not really implementing the Smart Specialisation strategy.

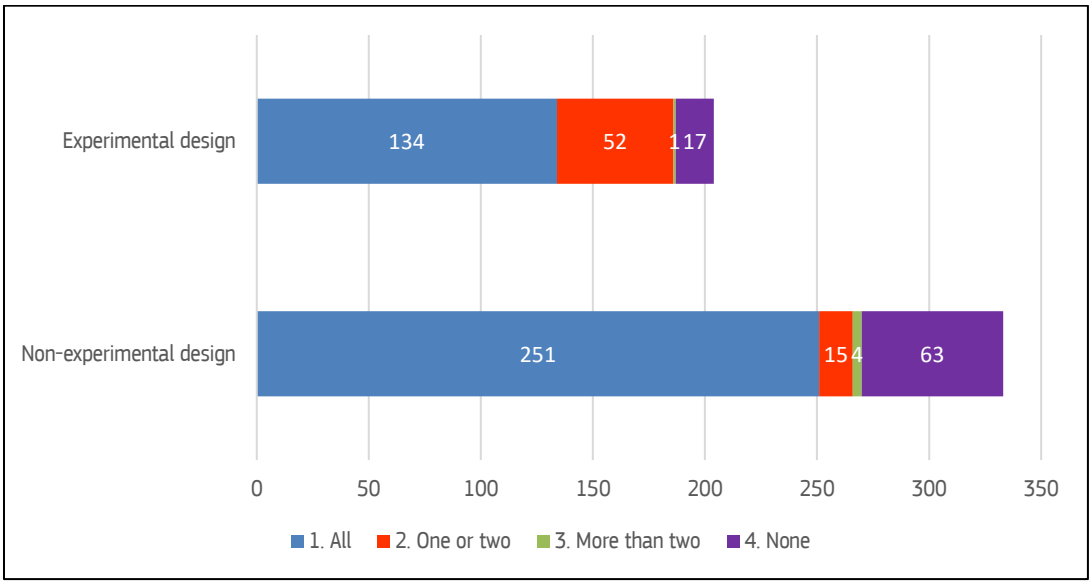
Figure 2. Number of priorities and alignment of the calls



It is useful at this point to investigate whether the number of priorities is different for calls with experimental design. These results are presented in Figure 3.

Experimental design calls are in general more focused than the average. In this case, in fact, 25.5% of calls address just one or two S3 priorities, while only 8.3% have no S3 priority at all. Calls with no experimental design, on the other hand, address more often all priorities and one or two priorities in only 4.5% of cases.

Figure 3. Number of priorities and alignment of experimental calls



5.2.3 Do calls support collaboration? (Hypothesis 2a)

To test whether Smart Specialisation strategies support collaboration in practice, the calls have been analysed in terms of the types of beneficiaries. Most calls have more than one type of beneficiary, for this reason the analysis does not follow a single variable but elaborates on the whole set of information available in the dataset on beneficiaries.

Most often, calls with multiple types of beneficiaries do not report a breakdown of the funds according to the categories of beneficiaries; also, it is rare to find a stated percentage of funding for collaborative research projects and another for individual projects.

The list of beneficiaries mentioned in the 537 calls analysed is presented in Figure 4. Among all calls, only three do not report specific information on beneficiaries.

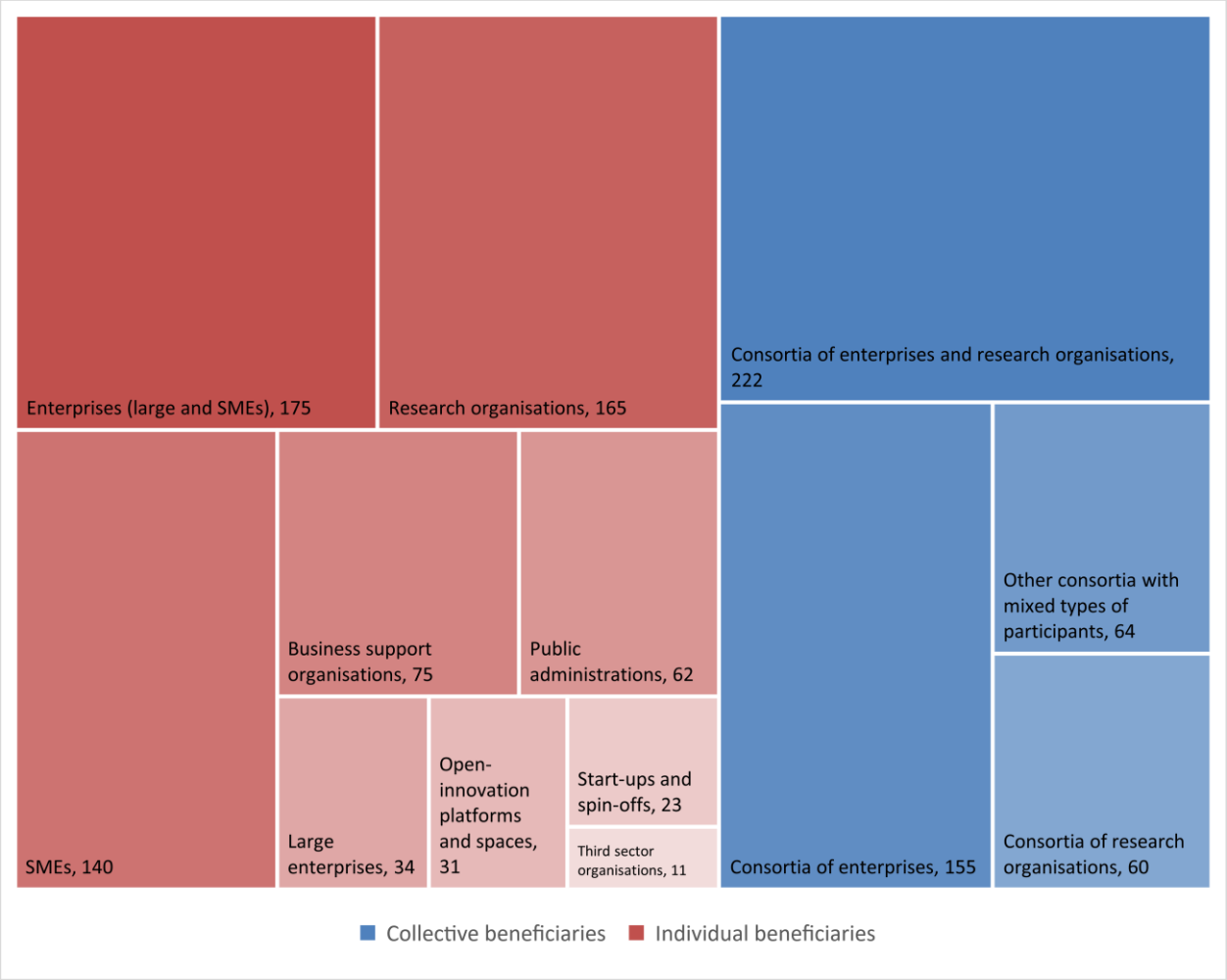
The most common beneficiaries are "Consortia of enterprises and research organisations" (222 mentions), "Enterprises (large and SMEs)" (175 mentions), "Research organisations" (165 mentions), "Consortia of enterprises" (155 mentions), and "SMEs" (140 mentions). The remaining categories follow with much less mentions. 223 calls have only one type of beneficiaries, while the rest has at least two.

The analysis of beneficiaries provides the basis for a classification of calls according to their collaborative extent. Collaboration calls are those calls which have any type of consortia among their beneficiaries (the following beneficiaries: "Consortia of research organisations", "Consortia of enterprises and research organisations", "Consortia of enterprises", "Other consortia with mixed types of participants").

The classification is threefold, as follows:

- **Pure collaboration calls**: where there are only consortia as type of beneficiaries, while no other type of beneficiary is eligible. This forces the potential applicants to collaborate.
- **Hybrid calls**: where the beneficiaries can be individual agents (firms, research institutions, public administration, etc.), but also consortia of the various types. In this case, the collaboration is not a mandatory requirement for the call, but an option.
- **Single beneficiary calls**: the residual category of calls, whose beneficiaries are never including consortia of any type. There is no collaboration involved with this type of calls and hence no stimulus to aggregate.

Figure 4. Beneficiaries of the calls, number of mentions



By looking at Table 9, it can be seen that pure collaboration calls represent a minority of calls, slightly less than 15%, while other collaborations are more diffused, representing 46%. Therefore, in total around 60% of the examined calls are open to support collaboration. Calls with no collaboration, on the other hand, almost represent the 40% of the total.

By looking at this result, it seems that the stimulus to collaboration is overall quite pervasive.

In Table 9, it is also possible to look at the number of collaborative calls by type of territory, to see whether collaboration incentives are more diffused among more developed regions, where the structure of the economy should be more advanced and the administrative capacity to manage those more complex calls higher. This hypothesis is confirmed, but only to a limited extent. In fact, pure collaboration calls are more diffused in more developed regions and national programmes than in less developed and transition regions, yet they remain a minority. The number of non-collaborative calls, moreover, is similar in the different types of regions, and even lower than average in transition ones.

Table 9. Collaborative calls by territorial classification

Collaborative calls	1. Less developed regions	2. Transition regions	3. More developed regions	4. National Programmes	Total
Pure collaboration calls	5 (10%)	1 (4.5%)	36 (14.9%)	38 (17%)	80 (14.9%)
Hybrid calls	25 (50%)	14 (63.6%)	119 (49.2%)	89 (39.9%)	247 (46%)
Single beneficiary calls	20 (40%)	7 (31.8%)	87 (36%)	96 (43%)	210 (39.1%)
Total	50 (100%)	22 (100%)	242 (100%)	223 (100%)	537 (100%)

Calls financing collaboration among beneficiaries are also slightly more often aligned with the S3 strategy (Table 10). In particular, pure collaboration calls are more aligned than the average, but hybrid calls are surprisingly even more aligned, having more aligned calls with preferential evaluation and less calls with no alignment at all.

Table 10. Alignment with S3 by type of collaborative calls

Type of Call	1. Aligned calls with preferential evaluation	2. Aligned calls with no preferential evaluation	3. Calls with preferential evaluation only	4. Calls not aligned with S3	Total
Pure collaboration calls	17 (21.3%)	49 (61.3%)	3 (3.8%)	11 (13.8%)	80 (100%)
Hybrid calls	69 (27.9%)	142 (57.5%)	10 (4%)	26 (10.5%)	247 (100%)
Single beneficiary calls	30 (14.3%)	123 (58.6%)	15 (7.1%)	42 (20%)	210 (100%)
Total	116 (21.6%)	314 (58.5%)	28 (5.2%)	79 (14.7%)	537 (100%)

5.2.4 Do calls provide for special mechanisms that facilitate subsequent entry into emerging activities? (Hypothesis 2b)

One of the aspects which should characterise Smart Specialisation is the fact that emerging activities should not be limited to the first round innovators, but should subsequently diffuse within the local economy and allow other firms and actors to entry. Following that idea, some calls could include specific requirements in terms of public disclosure of results. This has been investigated directly with the help of the experts and the results of the enquiry presented in Table 11.

As it can be observed, the specific request for disclosure is an event which takes place in about one third of the cases. When an explicit request for public disclosure is present, this normally involves publications, in the form of scientific and technical reports, databases, etc.; this represents about one quarter of the total calls.

More rarely, the request is for meetings or workshops, in about 7% of the cases, while the request for dedicated internet sites or other publication means are rare, 2% of the calls in total.

Calls with specific characteristics could be different in terms of the requirements of public disclosure. For this reason, it is important to look at calls with experimental design and collaborative calls, as presented in Table 11.

Experimental design calls are not keener on requiring to disclose the results, since they still do not request any in two thirds of the cases. However, they appear to require to disclose results in a different way. In fact, among the experimental design calls which require a disclosure, more than a half requires organising workshops and meetings, differently from ordinary calls in which this almost never happens.

Collaborative calls are not that different from the others, since they require disclosure in a slightly larger share of calls, but this difference is small. Moreover, pure collaboration calls do not disclose results in a different way. The only really sizeable difference regards hybrid calls which require significantly more often than average to organise meetings and workshops, even if this request is still rarer than the one to issue publications.

Table 11. Public disclosure of results in experimental and collaborative calls

	Experimental design			**Collaborative call**			
	No	**Yes**	**Total**	**Pure collaboration calls**	**Hybrid calls**	**Single beneficiary calls**	**Total**
NO public disclosure of results	212 (63.7%)	136 (66.7%)	348 (64.8%)	49 (61.3%)	154 (62.3%)	145 (69%)	348 (64.8%)
1. Publications (scientific and technical reports, databases, etc.)	107 (32.1%)	31 (15.2%)	138 (25.7%)	21 (26.3%)	59 (23.9%)	58 (27.6%)	138 (25.7%)
2. Meetings/workshops	3 (0.9%)	35 (17.2%)	38 (7.1%)	2 (2.5%)	34 (13.8%)	2 (1%)	38 (7.1%)
3. Internet site dedicated	4 (1.2%)	1 (0.5%)	5 (0.9%)	3 (3.8%)	-	2 (1%)	5 (0.9%)
4. Other	7 (2.1%)	1 (0.5%)	8 (1.5%)	5 (6.3%)	-	3 (1.4%)	8 (1.5%)
Total	333 (100%)	204 (100%)	537 (100%)	80 (100%)	247 (100%)	210 (100%)	537 (100%)

5.2.5 Do calls provide for the establishment of stakeholder association/networks/work groups? (Hypothesis 3a)

The calls which specifically require to form or join stakeholder associations are a tiny fraction of the total, as it can be observed in Table 12.

It is however possible that they are more common among calls with specific characteristics, in terms of experimental design, collaborative characteristics or alignment with the S3 strategy.

As it can be observed in Table 12, calls with stakeholder association are more diffused among experimental design calls, but still remain a small fraction of them, the 8%.

Calls with stakeholder association are also more diffused among pure collaboration calls, going up to more than 11%, but are rare among hybrid calls.

Finally, as expected, aligned calls with preferential evaluation are also keener to require stakeholder associations, in the 9.5% of cases, but when the alignment is without preferential evaluation this value reduces to a lower than average share.

Table 12. Presence of calls with stakeholder collaboration by type of call

	Calls without stakeholder association	**Calls with stakeholder association**	**Total**
No experimental design	321 (96.4%)	12 (3.6%)	333 (100%)
Experimental design	186 (91.2%)	18 (8.8%)	204 (100%)
Total	507 (94.4%)	30 (5.6%)	537 (100%)
Pure collaboration calls	71 (88.8%)	9 (11.3%)	80 (100%)
Hybrid calls	243 (98.4%)	4 (1.6%)	247 (100%)
Single beneficiary calls	193 (91.9%)	17 (8.1%)	210 (100%)
Total	507 (94.4%)	30 (5.6%)	537 (100%)
1. Aligned calls with preferential evaluation	105 (90.5%)	11 (9.5%)	116 (100%)
2. Aligned calls with no preferential evaluation	301 (95.9%)	13 (4.1%)	314 (100%)
3. Calls with preferential evaluation only	27 (96.4%)	1 (3.6%)	28 (100%)
4. Calls not aligned with S3	74 (93.7%)	5 (6.3%)	79 (100%)
Total	507 (94.4%)	30 (5.6%)	537 (100%)

The calls establishing stakeholder associations are atypical on many aspects, including the fact that they are normally set up and endured without the need of issuing new ones (once the association is formed, it can develop autonomously). It is hence possible that these calls are rare because the regions only issue a few of them, not needing more.

To see whether this is the case, Table 13 verifies the presence of calls with stakeholder association within the 23 territorial entities comprised in the study, evidencing in bold those regions which used them, as well as the typology of regions to which they belong.

The results are very interesting, because it turns out that only 8 out of 23 territories have calls with stakeholder association. Those that have them tend to have more than one, with the exception of Lombardy. There is even the limit case of 6Aika-Six Cities strategy in Finland, which only has seven calls and all of them with stakeholder association.

In terms of countries, there is not a clear association. There are in fact calls with stakeholder association in Finland, Germany, Italy, Poland, Slovenia and Spain, while only Hungary and Sweden do not have any of them. In those countries which use them, however, the diffusion is uneven, with regions which issue them and regions which do not. In the case of Italy, where diffusion is ampler, they are used in three out of five regions, in the case of Spain, in only one region, in the case of Poland, only at national level.

There is no evident pattern in the type of regions which use this type of calls. They are present among lagging regions (e.g. Abruzzo), advanced regions (e.g. Catalonia) and at national/interregional level (Poland, Slovenia, 6Aika-Six Cities strategy).

This evidence suggests that there is the need for specific case studies on the use of this type of calls, since some regions have experimented with them and many others have not. In this way, those regions which did not experiment could learn from the experience of the other regions which acted as forerunners.

Table 13. Presence of calls with stakeholder collaboration in the various regional case studies

Country	***Region***	***Calls with stakeholder association***	***Other calls***	***Total calls***
Finland	**6Aika-Six Cities**	**7**	0	7
Finland	Helsinki-Uusimaa	0	8	8
Finland	Lapland	0	12	12
Finland	Ostrobothnia	0	12	12
Germany	**North Rhine-Westphalia**	**3**	37	40
Hungary	Central Hungary	0	6	6
Hungary	except Central Hungary	0	18	18
Italy	Abruzzo	0	4	4
Italy	**Campania**	**2**	10	12
Italy	**Emilia Romagna**	**2**	17	19
Italy	**Lombardia**	**1**	17	18
Italy	Toscana	0	26	26
Poland	Lubelskie	0	19	19
Poland	Mazowieckie	0	18	18
Poland	**National level**	**5**	146	151
Poland	Śląskie	0	19	19
Slovenia	**Slovenia**	**2**	13	15
Spain	**Catalonia**	**8**	21	29
Spain	Galicia	0	17	17
Spain	Spain	0	32	32
Spain	Valencian Community	0	33	33
Sweden	VästSverige (West Sweden)	0	12	12
Sweden	Övre Norrland (Upper Norrland)	0	10	10
TOTAL		30	507	537

5.2.6 Do calls address specific business-support organisations, networks, platforms? (Hypothesis 3b)

The various calls related to Smart Specialisation strategies support to a certain degree business-support organizations, networks and platforms (Figure 4). This happens more often when they do not have an experimental design (Table 14), suggesting that these organisations were already supported in the past.

More specifically, "Business support organizations" (including clusters, technological districts, etc.) are among the beneficiaries in 14% (75) of the all calls and "Open innovation platforms and spaces" in 6% (31). Generally, calls targeting intermediary organisations finance the operating costs of already existing (or new) bodies to carry out activities on S3 priority areas (e.g. Toscana, Emilia Romagna, Catalonia, Slovenia, etc.). As discussed by Guzzo and Gianelle (2021), governments often rely on the support of such types of organisations in order to organise and keep the entrepreneurial discovery process going, to launch pilot projects and to promote joint initiatives between different categories of actors. When these organisations are adequately staffed and function well, they can in fact play a central role in promoting and facilitating collective action by reducing coordination costs. They are key partners in the production and circulation of new knowledge on economic activities, technologies and markets. Besides, they help to develop and diffuse new ideas and narratives, while strengthening networks of individuals and organisations.

Table 14. Calls having a certain type of beneficiary depending on their experimental design

	Non-experimental design	**Experimental design**	**Total**
Consortia of enterprises and research organisations	107 (32.1%)	115 (57.2%)	222 (41.6%)
Enterprises (large and SMEs)	75 (22.5%)	100 (49.8%)	175 (32.8%)
Research organisations	89 (26.7%)	76 (37.8%)	165 (30.9%)
Consortia of enterprises	67 (20.1%)	88 (43.8%)	155 (29%)
SMEs	117 (35.1%)	23 (11.4%)	140 (26.2%)
Business support organisations	59 (17.7%)	16 (8%)	75 (14%)
Other consortia with mixed types of participants	29 (8.7%)	35 (17.4%)	64 (12%)
Public administrations	35 (10.5%)	27 (13.4%)	62 (11.6%)
Consortia of research organisations	37 (11.1%)	23 (11.4%)	60 (11.2%)
Large enterprises	21 (6.3%)	13 (6.5%)	34 (6.4%)
Open-innovation platforms and spaces (fablabs, maker spaces, coworking spaces, etc.)	24 (7.2%)	7 (3.5%)	31 (5.8%)
Start-ups and spin-offs	20 (6%)	3 (1.5%)	23 (4.3%)
Other	14 (4.2%)	5 (2.5%)	19 (3.6%)
Third sector organisations and associations	3 (0.9%)	8 (4%)	11 (2.1%)
Financial institutions	2 (0.6%)	2 (1%)	4 (0.7%)
Total number of calls (**)	333 (100%)	201 (100%)	534 (100%)

(**) Remember that each call may have more than one type of beneficiary. Three calls do no report the type of beneficiaries and are not computed in the total.

6. Conclusions

This report explores how policy intervention measures implemented under the Thematic Objective 1 "Strengthening research, technological development and innovation" of national and regional Operational Programmes co-financed by the European Regional Development Fund have incorporated key Smart Specialisation principles during the programming period 2014-2020. The information examined is extracted from 537 calls for projects launched under 22 OPs at national and regional level in Italy, Poland, Spain, Finland, Hungary, Slovenia, Germany, and Sweden by mid-2020; those calls represent the totality of the ERDF-TO1 calls published up to mid-2020 under ERDF-TO1 in the countries and regions covered in the analysis.

The sample used in the analysis does not have the width of the whole EU and the exercise is therefore exploratory, and would need to be replicated for the missing programmes. Notwithstanding such limitations, the sample is quite representative, including programmes from eight different countries, national programmes and regional programmes in all three types of regions (more developed, transition and less developed). The strength of the analysis is its depth: the knowledge which was collected, systemically encompasses all the calls in the selected programmes, which means that there is no possible bias due to the fact that some calls are more visible than others. Pending wider-scale validation, it can therefore be expected that the results are representative of the trends taking place within the whole sample of programmes.

We test three main research hypotheses: (i) S3 is a selective policy that concentrates public intervention on a few investment priorities; (ii) S3 favours the establishment of a critical mass of entrepreneurial initiatives in identified investment areas; (iii) S3 promotes the organization and strengthening of stakeholder communities. In order to better contextualise the analysis, we also provide a thorough description of several additional dimensions of along which to analyse the data.

In general, we find that the **policy instruments** deployed by the examined calls are quite traditional, with a marked preference for supply-side instruments, especially for various forms of subsidies to "Support to RTD&I projects", and a very limited use of demand-side instruments like "Public procurement for R&D and innovation". We can therefore conclude that the Smart Specialisation strategies of the regions and countries covered in the analysis, mostly apply a limited portfolio of instruments and, basically, the traditional ones. This would limit the capacity of public intervention to fully adapt to the specificities and needs of the local context, leaving a margin for improving policy design. The marginal use of innovative public procurement is especially striking, given the considerable effort to promote this type of intervention by European authorities over the past years.

The calls that exhibit an **experimental design** that is to say calls featuring elements of novelty compared to the previous policy making tradition in their territories, are in general found to be more focused on single S3 priorities, more collaborative, and less concerned with horizontal instruments, hence better embodying the S3 principles. The presence of this type of calls signals a tentative break with tradition and with path dependency which is in line with the spirit of Smart Specialisation. About one third of the calls examined exhibits such experimental characteristics and the share is smaller in regional OPs, signalling a first change of paradigm which still leaves a margin for improvement.

Regarding the **selectivity** of Smart Specialisation calls, we found that the **alignment** between the call and the S3 priorities is guaranteed in the vast majority of cases by a substantial eligibility clause that implies the exclusion from the competition of the projects which do not contribute to or fall into the investment priority areas identified in the Smart Specialisation strategy. Substantial alignment between the call and the S3 strategy is a necessary condition for the policy to be able to concentrate resources on selected priorities and create a potential critical mass of investment. Nevertheless, it is by itself not sufficient to guarantee such result. As noted in previous works (Gianelle et al., 2020), it is also necessary to look at how the priorities were defined in the strategies and how much focused they are. Moreover, in our database there is a non-negligible share of calls, around 15%, which does not appear to be aligned with the S3 priorities. The number of policy measures extending their effects beyond the scope of S3 priorities may also be higher due to the re-

orientation of ERDF-TO1 interventions towards contrasting the effects of the COVID-19 pandemic. Therefore, the selectivity of those interventions may be further diluted.

Another aspect of selectivity for which we did not find general evidence is the **customisation** of intervention to S3 priorities: a large majority of calls address all priorities at the same time, acting horizontally across different areas of the economy rather than specifically in each area, as the Smart Specialisation approach would require. This evidence altogether may reveal that the necessity for policy measures that follow the vertical logic of intervention of Smart Specialisation should be systematically assessed against the competing need for more horizontal measures.

As far as the **support to individual and collaborative entrepreneurial initiatives** in identified investment areas is concerned, we find the following evidence. Overall, it seems that the stimulus to collaboration among actors of the innovation ecosystem is present in a quite pervasive way. While calls purposely designed to exclusively promote collaboration are around 15% of the total, many more calls include collaboration as a possibility, although they are not designed specifically for that. We also found that specific result-disclosure obligations for the beneficiaries, supporting the diffusion of emerging activities within the local economy by allowing other firms and actors to entry, are present in around one third of the calls. All in all, we consider that there is quite pervasive evidence of an effective support to the building up of a critical mass of entrepreneurial activities (e.g. the emergence of new clusters).

Finally, as far as the organization and strengthening of **stakeholder communities** is concerned, we found that only eight out of the 23 territories covered in the analysis have calls providing for the establishment of stakeholder association. The various calls related to Smart Specialisation strategies tend to support different types of business-support organizations, networks and platforms in around one over five cases, showing that those organisations are regarded as important by the policy makers. Overall, we think there is still limited evidence of a widespread support to the formation and strengthening of stakeholder communities around the S3 priorities, and this is definitely an area where improvement is needed and possible.

7. Key policy recommendations

- Promote a **more balanced and diverse portfolio of policy instruments**, with renewed attention to demand-side instruments like innovative public procurement. Currently, most regions and countries seem to focus on the most traditional supply-side instruments, although sometimes with innovations in the way they are deployed.
- Verify the possible remaining **necessity for instruments which are not aligned with the Smart Specialisation strategy** and its vertical logic of intervention. Currently, there is a residual but significant share of calls which are not aligned with S3. This may be due to poor implementation of the strategy, but also to real needs for horizontal measures.
- Support the **exchange of good practices on the experimental design of calls**. There is room for specific research on the use of this type of calls, since some regions have experimented with them and many others have not. In this way, those regions which did not experiment could learn from the experience of the other regions which acted as forerunners.
- **Stakeholder associations organized around specific Smart Specialisation priority areas** should be further and more explicitly supported in order to create networking fora and opportunities for synergies among the actors of the innovation ecosystem. The existence of some experiences in this sense can be a starting point to further spread those practices.

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List of abbreviations and definitions

DG REGIO	Directorate-General for Regional and Urban Policy
ERDF	European regional Development Fund
EU	European Union
JRC	Joint Research Centre
MEIF	Main Economic Improvement Fund
OP	Operational Programme
S3	Smart Specialisation
TO1	Thematic Objective 1

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Annexes

Annex 1. Taxonomies used for the analysis

Table A1. Types of policy instruments

N.	Type of instrument	Description
1	Support to RTD&I projects	Funding for different typologies of RTD&I projects ("industrial research and experimental development", collaborative research, product development, commercialisation, innovation management, etc.). It usually includes the acquisition of specialised service, machinery and equipment, as well as research personnel expenses. Funding may be provided through grants, and other financial instruments (credit loans, repayable grants, equity financing, etc.).
2	Support to innovative SMEs creation and strengthening	Funding for RTD&I projects linked to the creation or strengthening of start-ups, spin-offs and innovative SMEs. It also includes public funding provided to financial service providers.
3	Innovation support services	Funding provided usually in the form of a voucher aimed to purchase innovation and technological services from public or private providers with a view to introducing innovations in current business operations. This category also includes support to advice and counselling services for technology transfer and absorption, or support for improved management and organisation change, information provision, training, etc. This category also includes the IPR protection services.
4	Public procurement for R&D and innovation	Funding aimed to create a demand for technologies and services that does not currently exist or is considered too low, or to target the purchase of R&D services (pre-commercial procurement of R&D).
5	Innovation prizes	Cash reward (or other type prize) provided for innovative business idea or innovative solutions to specific challenges.
6	Support to research infrastructures	Support to the establishment and strengthening of research infrastructures and to ESFRI – European Strategy for Research Infrastructure plans.
7	Support to business support organisations, innovation networks and platforms	Support to the establishment and strengthening of incubators, technology parks, clusters, innovation and competitiveness poles, technological districts, competence centres, innovation intermediaries, open-innovation platforms and spaces such as fablabs, maker spaces, co-working spaces, etc.

Table A2. Types of beneficiaries

N.	Type of beneficiary
1	SMEs
2	Start-ups and spin-offs
3	Large enterprises
4	Enterprises (large and SMEs)
5	Research organisations
6	Consortia of research organisations
7	Consortia of enterprises and research organisations
8	Consortia of enterprises
9	Other consortia with mixed types of participants
10	Business support organisations
11	Open-innovation platforms and spaces (fablabs, maker spaces, coworking spaces, etc.)
12	Financial institutions
13	Public administrations
14	Third sector organisations and associations
15	Other

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