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10 years of cooperation on the Thematic Smart Specialisation Platforms. Could macro-regional strategies foster S3-related interregional cooperation?

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Abstract: The article analyses the extent to which the specific policy measures introduced in the 2021-2027 programming period have had an impact on the problems associated with interregional cooperation around smart specialisation priorities on the Thematic Smart Specialisation Platforms (TSSPs). The improvements are considerable, but some weaknesses persist. Lagging regions are more engaged on the platforms and quadruple helix stakeholders, including businesses and business support organisations, are currently involved in partnerships. However, lagging regions are still in minority on the platforms and many of them remain outside. Partnerships do not manage to use the funding available from EU level instruments and from Cohesion Policy in complementarity. The Interreg programmes are an exception. The interregional cooperation linked to smart specialisation should be further improved. Macro-regional strategies could not only offer a space for the alignment of regional research and innovation policies and support S3-related interregional collaboration but could also benefit from these.

Keywords: smart specialisation, interregional cooperation, TSSPs, outward looking dimension of S3, thematic platforms, macro-regional strategies

Introduction

Smart specialisation strategies (S3s) are the third generation of research and innovation strategies in the European Union (EU) (Asheim et al., 2020; Lagendijk & Varró, 2013). These are a conditionality for the use of funds for research and innovation investments under Cohesion Policy since 2014-2020 (Foray, 2017; McCann, 2015; Regulation (EU) 2021/1060). The outward looking, external or international dimension, or, in other words, the role of interregional cooperation was built into the smart specialisation approach from the start (Foray et al., 2019; Hassink & Gong, 2019; Radosevic & Ciampi Stancova, 2018; Uyarra et al., 2018). This was also criticised as being an ’unrealistic’ expectation of the policy (Benner, 2020).

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S3 should carefully balance intra- and interregional network development (Sörvik et al., 2018), in the advantage of both developed and less developed regions (Iacobucci & Guzzini, 2016). The latter should benefit the most from interregional cooperation, as the import of knowledge, technologies and the attraction of investors from more advanced regions can support their development (Asheim et al., 2016; Balland & Boschma, 2021; Belussi et al., 2018; Boschma & Iammarino, 2009; Isaksen & Trippl, 2017; Kruse & Wedemeier, 2022; Miguélez & Moreno, 2015; Neffke et al., 2017; Wolford et al., 2021). To support S3-related interregional cooperation three Thematic Smart Specialisation Platforms (TSSPs) were set up, in 2015, connecting policymakers and regional stakeholders (Hegyi & Rakhmatullin, 2017; 2020; Mariussen et al., 2019). The European Commission (2017) emphasised the need for interregional cooperation between less developed, transition and developed regions, and for leveraging to this end the different funding instruments from EU level and Cohesion Policy programmes.

Previous research related to TSSPs highlighted a series of challenges linked to the cooperation within the partnerships, such as the reduced participation of lagging regions and of businesses and business support organisations, lack of strategic focus of partnerships (Cavicchi & Ciampi Stancova, 2017; Hegyi & Rakhmatullin, 2017; Woolford et al., 2021). It has been posited by scholars that the interregional dimension of S3 would require more attention in order to raise the efficiency of collaborations (Balland & Boschma, 2021; Iacobucci & Guzzini, 2016), and that there should be more financial support for interregional partnerships (Uyarra et al., 2018). Starting with the 2021-2027 programming period, the European Commission (EC) has introduced a specific fulfilment criterion for S3s regarding interregional cooperation (Regulation (EU) 2021/1060) and launched a dedicated instrument for interregional innovation projects (Regulation (EU) 2021/1058). There is a greater emphasis on synergies and complementarities between Cohesion Policy financing for S3s and relevant EU level funding instruments. Partnerships can rely on methodological guides (Hegyi & Rakhmatullin, 2020; Rakhmatullin et al., 2020) and the selection criteria for TSSP partnerships has been revised.

Given this background, the paper aims to analyse the extent to which the newly introduced policy measures have had an impact on overcoming the problems previously highlighted in the literature linked to S3-related interregional collaboration. By doing this, the paper builds on, continues and expands previous research on these platforms focusing on the participation of lagging regions in such partnerships (Woolford et al., 2021), on the partnerships and collaboration on the agri-food and industrial modernisation TSSPs (Cavicchi & Ciampi Stancova, 2017; Hegyi & Rakhmatullin, 2017), and on the potential contribution of TSSP partnerships to the UN's Agenda 2030 (Rakhmatullin & Hegyi, 2021). Moreover, the paper examines the results accomplished by the partnerships and their capacity to leverage funding in a complementary manner. This was recommended as a potential avenue for future research by Uyarra et al. (2018). A broader study,

covering all the existing TSSPs, the results of the partnerships, and the effects of the new policy measures introduced by the EC, has not been done under the current programming period. The findings are relevant for the way in which S3-related interregional cooperation continues in the next financial exercise. The TSSP partnerships could contribute to further alignment between the EU, the national and regional level research and innovation policies and a more enhanced cooperation within the European innovation system in line with the recommendation of policy experts (Draghi, 2024) and scholars (Asheim & Herstad, 2021).

The research relies on the data and information available on the TSSPs by the end of September 2024 for 38 partnerships, including participating regions, partners involved in each partnership, and their results. This represents a limitation, as additional, qualitative information would be needed to formulate more precise recommendations on how to further improve S3-related interregional collaboration. The paper commences with a literature review regarding the role of interregional collaboration related to S3, encompassing a presentation of the TSSPs and a summary of the results of previous research on interregional partnerships. This is followed by the description of the methodology used and the presentation of the data and information analysed. The paper resumes with discussions and conclusions.

1. S3 and interregional collaboration through Thematic Platforms

S3s have been introduced in the 2014-2020 programming period as an ex-ante conditionality for the use of the European Regional Development Fund (ERDF) to support investments in research and innovation by Member States and regions (Foray, 2017; McCann, 2015). By now S3s have also been developed in several countries outside the EU (Kruse & Wedemeier, 2022). The smart specialisation approach had interregional collaboration in view from the beginning (Hassink & Gong, 2019; Radosevic & Ciampi Stancova, 2018; Uyarra et al., 2018). The official methodological guide for S3 design underlined the need to perform regional benchmarking and to focus on the integration in value chains or into wider scientific and innovation networks (Foray et al., 2012). The latter is significant, given that regional innovation systems do not function within boundaries or in isolation (Asheim et al., 2011). These are part of wider – national and global – systems and have horizontal interactions with sectoral and technological ones (Frenz & Oughton, 2005, as cited in Asheim et al., 2011). Less developed regions were further recommended to involve external stakeholders in the entrepreneurial discovery, a process of key importance, meant to assure the involvement of and interaction between quadruple helix stakeholders linked to S3 (Foray, 2017).

S3-related interregional cooperation can be advantageous for all types of regions, allowing for developed ones to export research results and technology, and for less developed ones to identify new sources of knowledge (Iacobucci & Guzzini, 2016). It can support policy implementation, offering access to complementary

technologies, contributing to the integration in value chains, and to the exploitation of synergies between Cohesion Policy and EU level financing sources (Mariussen et al., 2019; Radosevic & Ciampi Stancova, 2018). Interregional collaborations can help regions in overcoming funding gaps and capability failures related to innovation and can contribute to the development of skills and competencies (Hegyi & Rakhmatullin, 2017). These can also foster policy learning, prevent policy capture and can lead to the alignment of funding or even policy integration (Uyarra et al., 2018; Wolford et al., 2021). This latter, nonetheless, was pointed out as being difficult in practice, considering some of the shortcomings from the methodological guidance (Kruse & Wedemeier, 2022). Interregional cooperation is facilitated in general by geographical, cultural, cognitive and functional proximity (Balland & Boschma, 2021; Boschma & Iammarino, 2009; Wolford et al., 2021). Cultural and geographic proximity also foster the participation in value chains (Antràs & de Gortari, 2020; Doan, 2023).

Less developed regions should benefit the most from interregional cooperations linked to S3 (Kruse & Wedemeier, 2022; Miguélez & Moreno, 2015; Wolford et al., 2021). Key actors from outside can support these regions in the uptake and use of new technologies and provide complementary knowledge, which serve as catalysts for their development (Asheim et al., 2016; Belussi et al., 2018; Foray, 2019). Interregional collaboration can lead to economic diversification in weaker regions and the creation of new industrial paths, driving structural changes through the inflow of knowledge, capabilities and technologies, or the establishment of economic agents from other regions (Balland & Boschma, 2021; Boschma & Iammarino, 2009; Isaksen & Trippl, 2017; Neffke et al., 2017). Such an inflow of foreign direct investment from Nordic countries has been instrumental in facilitating the enhancement of innovation performance in countries like Estonia (Paas & Poltimäe, 2012).

Less developed regions encounter certain obstacles related to interregional collaboration. They might lack the absorptive capacity, *i.e.* related economic specialisation and structure (Boschma & Iammarino, 2009), complementary knowledge, capabilities and technologies that are necessary for exploiting the benefits of interregional collaboration (Balland & Boschma, 2021; Miguélez & Moreno, 2015). Less developed entrepreneurial environments and R&D capacities (Varga et al., 2020) or shortcomings in specialised human resources are further impediments (Sörvik et al., 2018). This is why in practice more developed regions benefit more from interregional cooperation (Santoalha, 2018).

The role of interregional collaboration in smart specialisation was officially acknowledged in 2017 (Hegyi & Rakhmatullin, 2020). By that time 100 regions were already involved in 17 interregional partnerships on the TSSPs (European Commission, 2017). The wider thematic areas - industrial modernisation, energy and agri-food -, for the three platforms launched in 2015, were defined considering the smart specialisation priorities selected by different regions (Hegyi & Rakhmatullin,

2017). TSSPs were seen as policy pilots, connecting regional actors in collaborative networks, and allowing for testing, experimentation and policy-learning, as well as the exploitation of complementary capacities, knowledge and resources, before large scale implementation of innovative business investment and value chain development projects (Hegyi & Rakhmatullin, 2020; Mariussen et al., 2019). The TSSP on industrial modernisation was further expected to improve business environment, to lead to new projects, including Important Projects of Common European Interest, but also to support the joint use or sharing of piloting and testing infrastructure (Hegyi & Rakhmatoullin, 2017). TSSP partnerships were expected to bring together representatives of policy responsible and research organisations, as well as entrepreneurs and the civil society, alongside other members of the quadruple helix (e.g. clusters) from different regions (European Commission, 2017) and encouraged to use in synergy the Cohesion Policy and Horizon 2020 funding (Mariussen et al., 2019). Selected partnerships were to receive technical assistance (European Commission, 2017).

Previous research linked to the agri-food platform revealed that participation in such forms of interregional collaboration raises the quality of investment projects and opens new possibilities for businesses (Cavicchi & Ciampi Stancova, 2017). The same authors (Cavicchi & Ciampi Stancova, 2017) noted that for achieving optimal outcomes, companies and business support organisations should assume a more active role in the partnerships. Woolford et al. (2021) analysed the participation of lagging regions in TSSP partnerships. These were less developed and transition regions with low income or slow economic growth, underperforming in innovation (European Commission et al., 2017). At the time of the research, nine such Italian, Polish, Portuguese and Spanish regions were engaged on the platforms, as well as five NUTS2 areas from Hungary, Romania, Croatia, Bulgaria and Greece, each region being involved in one or two partnerships (Woolford et al., 2021).

Lagging regions' participation on TSSPs was conditioned by their development level, the characteristics of the regional innovation system and specific institutional arrangements (Woolford et al., 2021). Interested regions have met difficulties in joining such partnerships, as founding members preferred to restrict these 'clubs' to organisations they have had previous collaboration experience with (Uyarra et al., 2018). The same regions failed to capitalise on the financing available under the Horizon 2020 programme; however, they managed to leverage funding from the three strands - cross-border, transnational, and interregional - of Interreg programmes (Woolford et al., 2021). Out of these, the transnational programme (Interreg Europe), is generally acknowledged as a funding source for TSSP partnerships (Rakhmatullin et al., 2020). The programme supports policy learning.

Woolford et al. (2021) present the case of such an Interreg programme, the one for the Baltic, that, together with the EU Strategy for the Baltic Sea Region (EUSBR), offered a framework and a financing source for a project aiming to enhance cooperation between less and more developed regions linked to S3. EUSBR

was the first macro-regional strategy launched in 2009, followed by the strategies for the Danube, Adriatic and Ionian and Alpine regions (European Commission, n.d.a). A similar strategy for the Mediterranean macro-region is under development (CPRM Intermediterranean Commission, 2024). These strategies cover wider geographic areas, spanning through the territory of different countries, including non-EU states, connected by functional relations, common challenges, shared history and belief (Capello & Cerisola 2019; 2020; European Commission n.d.a; Gänzle, 2017; 2018). The cooperation between those involved allows for the synergic and complementary use of resources leading to increased competitiveness and reduced disparities (Capello & Cerisola, 2019; 2020). Macro-regional strategies also provide a framework for the alignment of objectives and the implementation of policies in an interconnected manner, supported by experimental, flexible and networked multi-level governance structures involving a wide array of stakeholders, and relying on already existing funding sources (Gänzle, 2017; 2018). Part of the transnational programmes (*i.e.* the Baltic, Adrion, Danube and Alpine Space Interreg B programmes), cover the same area as these macro-regional strategies (European Commission, n.d.a).

The S3-related interregional cooperation was reinforced in the current programming period. "Measures for enhancing cooperation with partners outside a given Member State in priority areas supported by the smart specialisation strategy" is a fulfilment criterion under the enabling condition for Policy Objective (PO) 1 financing innovation (Regulation (EU) 2021/1060). The synergies and complementarities between PO 1 and EU programmes, such as Horizon Europe and Digital Europe are enshrined in the specific Regulations (Regulation (EU) 2021/694; Regulation (EU) 2021/695). There is a new, dedicated funding instrument for S3-related interregional collaboration (Regulation (EU) 2021/1058). The various strands of the Interregional Innovation Investments (I3) Instrument emphasize the involvement of less developed and outermost regions in interregional cooperation projects targeting shared or complementary S3 priorities and supporting their integration in value chains. These also offer support for bringing innovation to the market in all types of regions. The 'S3 Community of Practice' initiative of the EC covers support for policymakers and stakeholders, including interregional collaboration, and hosts the TSSPs on its webpage. A fourth TSSP on sustainable blue economy was launched in 2022. The information for each partnership is updated based on the monitoring reports submitted every six months. Registered partnerships should remain open to new members and regions can participate in more than one partnership (Rakhmatullin et al., 2020). New partnerships should fulfil some requirements, such as the involvement of at least three regions out of which one less developed or outermost region, thematic relevance, involvement of or support from policy responsible organisations and wider European Networks or cluster organisations (European Commission, n.d.b). Partnerships interested to join the TSSPs should have a joint scope and potential for the demonstration,

commercialisation and scaling-up of innovations. These are further supported by methodological guidelines related to joint action planning and implementation, covering information on obtaining funding (Rakhmatullin et al., 2020). Guidance is also available for partnerships regarding monitoring and evaluation (Hegyi & Rakhmatullin, 2020). These new measures, instruments and guidelines respond to the challenges highlighted in the literature. Besides those already presented, a general difficulty, affecting all partnerships, was the lack of dedicated financing, of capacities and other resources (Uyarra et al., 2018).

Research and innovation and connected policies are expected to gain further importance in the next financial exercise. The Draghi Report (Draghi, 2024) emphasises the need for a more focused approach and prioritisation in research and innovation policies, recommending a greater focus on policy alignment and a more enhanced cooperation within wider European and with global networks. Some authors have also advocated for more emphasis on the directionality of smart specialisation and a greater balance between more overarching and place-based policies strengthening links between global, European, national and regional levels (Asheim & Herstad, 2021).

2. Methodology

The methodology relies on the findings from literature and the data and information available on the TSSPs (European Commission, n.d.c) and aims to support answering the main and subsequent research questions. The main question – Have the policy measures introduced for the 2021-2027 programming period contributed to overcoming the bottlenecks identified in the literature in relation to TSSP partnerships and what are the results achieved? – is further broken down into more specific questions:

- Is there an improvement concerning the participation of EU lagging regions on the platforms?
- Is there an involvement on behalf of various types of key actors, and specifically, businesses and / or business support organisations?
- To what extent do partnerships manage to leverage available funding instruments in synergy and complementarity?
- Besides the projects funded from the EU budget, are there other results reported?

The study relies on desk research, which represents one of its limitations. The data and information were collected from the four TSSPs (European Commission, n.d.c) in mid-2024 and last updated in September 2024. The date is important, as the details published for each partnership are updated in time. New partnerships are also added. 38 partnerships were registered on the TSSPs when the data collection was finalised. As a first step, most of the available data was gathered for each partnership, covering the partnerships' name, the year of its establishment, participating lead and partner regions, number and type of partners, number of related projects and their

sources of financing and other results. The objective and mission of the partnerships was not included, as it was not relevant from the perspective of the research questions, and neither were the activities that are presented for some of the partnerships. If necessary, further information was gathered from additional web-sources. This covered searches about the type of the organisations included in the partnerships, in case this was unclear or missing, and for the funding source of certain projects included in the results section. The latter was easier when the links to project websites were provided by partnerships. The availability and granularity of the data represents a further limitation, as information on each partner's role or their level of involvement is not included. The action plans and monitoring reports submitted by partnerships are not available either. The information collected was included in a table for further processing and synthesis. The role of regions in a partnership (lead or partner) was not considered in the final synthesis. This decision was made as the research revealed that many partnerships have a rotating leadership. A couple of partnerships also include a list of associated partners. These were treated separately from the information related to participating organisations.

As a second step, the participating lagging regions were identified in each partnership. All the 78 less developed regions included in the Commission Implementing Decision (EU) 2021/1130 (European Commission, 2021), regardless of their innovation performance – emerging or moderate innovator – in the latest Regional Innovation Scoreboard (European Commission et al., 2023) were included in this category. The list was further extended to additionally cover five transition regions that are emerging innovators according to the same source. Two of these – Canarias and Corse from Spain and France – are outermost regions (European Union, 2016). More developed regions with a low innovation performance were not included. These choices were made considering the literature review, the approach applied by the new I3 instrument and the definition of lagging regions used in the previous programming period (European Commission et al., 2017). This group of lagging regions includes Latvia, a smaller member state corresponding to the NUTS2 level. Other countries comprising several regions, at different development levels, were counted in the overall number of participations, however, due to the focus of the research on NUTS2 regions, were not included as areas lagging behind, despite of their development level or innovation performance (e.g. member states such as Hungary and Slovakia, each involved in one partnership, Lithuania, involved in two, respectively Slovenia involved in seven partnerships). The same approach was followed if partnerships included accession countries. These were marked separately though, as their involvement on the TSSPs was not expected. If, within the geographical coverage of partnerships, the sub-regional (NUTS3 or LAU) level was indicated, the corresponding NUTS2 level was selected relying on the Eurostat correspondence tables (European Union, n.d.).

3. Presentation and analysis of the TSSP partnerships

Since 2017, the number of partnerships grew from 17 to 38 by September 2024. Eight, respectively four new partnerships registered in 2018 and 2019, followed by further ten in 2020. Most partnerships are on the industrial modernisation platform. 30 out of the 38 TSSP partnerships include lagging regions, but these are still underrepresented on the platforms, as they count for approximately 18% of the regions involved (Table 1). Around half of the lagging regions participate in partnerships (42 out of 83). Most are emerging innovators (European Commission et al., 2023). The ratio of participation on country level is similar. Approximately 50% of the lagging regions from the relevant Members States are active on TSSPs. The exceptions are Romania, Bulgaria and Slovakia with less than half of their lagging regions participating in this type of interregional collaboration (Table 2). The lagging regions from more developed countries, such as France or Belgium are not involved in any of the partnerships. Most lagging regions (21) are part of 2-4 partnerships. These regions are more active on the industrial modernisation platform. The balance between more advanced and lagging regions is better on the energy TSSP. Four partnerships also involve accession countries: (a) Moldova is part of the 'BERRY+' partnership; (b) Armenia, Bosnia and Herzegovina, Georgia, Kosovo, Montenegro and Serbia are involved in the 'Cultural and Creative Regional Ecosystems' partnership; (c) Albania, Kosovo and Macedonia are in the 'Maritime Sustainable Blue Economy' partnership, (d) The Ukraine is part of the 'Smart sensors for agri-food' partnership.

Three lagging regions – Norte (Portugal), Andalusia (Spain) and Malopolskie (Poland) – stand out, each participating in six partnerships. All three regions are less developed, but with a better innovation performance (Table 2), qualified by the European Commission et al. (2023) as moderate innovators. Some of the more developed regions participate in a similar or an even bigger number of partnerships. Regions, such as Friuli Venezia Giulia, Piedmont and Tuscany (Italy), Asturias, Castile and Leon and Valencia (Spain), Baden-Württemberg and Saxony-Anhalt (Germany), Kainuu, Northern Ostrobothania and Lapland (Finland), Bretagne, Nouvelle Aquitaine and Pays de la Loire (France), Eastern Netherlands (Netherlands) are involved in six to nine partnerships each. So is Scotland (United Kingdom). Other more developed regions are even more active. Aragon, Basque Country, Galicia, Navarra (Spain), Lombardi (Italy), Auverge Rhone Alpes (France), North-Rhine-Westphalia (Germany) Flanders and Wallonia (Belgium) are participating in 10 to 16, while Catalonia (Spain) and Emilia Romagna (Italy) in 19, respectively 23 partnerships.

Organisations from the triple helix, such as businesses, cluster organisations, business and innovation support organisations or intermediaries, technology transfer organisations, universities and other research and development organisations are involved in almost every partnership. Apart from these local administrative units

(e.g. municipalities), specialised public agencies (e.g. energy agency), vocational schools, and civil society organisations also participate, as well as new structures, such as digital innovation hubs or technology platforms. For three partnerships ('Marine renewable energy', 'Artificial Intelligence and Human Machine Interface', 'Cultural and Creative Regional Ecosystems') a partners' list is not provided. Two partnerships only specify that each participating region involves quadruple helix stakeholders. The remaining 33 partnerships include one to 50 stakeholders other than policy-making organisations, with an average of 13 per partnership. Part of these further engage associated partners.

Quite a few partnerships include as members wider European networks or alliances, such as Arctic Sport Network, European Network of Cities and Regions, Social Economy Europe, European Association of Development Agencies, Network of European Regions for Sustainable and Competitive Tourism, European Chemical Regions Network, European Solar Photovoltaic Industry Alliance. In one case the EU Strategy for the Adriatic and Ionian Region is indicated as a partner. Collaboration with other networks, such as the Cluster Collaboration Platform, EIT Inno Energy or the Vanguard Initiative is mentioned as a result by some partnerships.

As results are concerned, partnerships mostly report on projects financed from EU funds, in the previous or current programming period, from Horizon 2020 and Horizon Europe, Interreg Europe and the I3 Instrument. Other funding sources frequently mentioned are COSME and EUROSTARS. Several partnerships also received technical assistance from the EC. Seven partnerships – including ones not covering lagging regions - report on various projects financed under Interreg A and B strands – cross-border cooperation and transnational cooperation programmes – mentioning under the latter the Danube, Adrion and Central Interreg programmes, as well as the Interreg Euro-MED, covering the Mediterranean. Other funding sources used for projects are the Erasmus+ Programme (3 partnerships), Urbact Programme (1 partnership), EIT HEI Initiative (1 partnership), Permanent Structured Cooperation Programme (1 partnership), a defence cooperation support set up by EU Member States. Two partnerships stand out from the rest by reporting also on projects financed from regional Cohesion Policy programmes, the Recovery and Resilience Fund or the regional budget. The number of EU-funded projects reported by partnerships is varying. Less than half (42%) of the partnerships have one or two projects. 15% of partnerships report about 3-4 projects, and the same percentage about 4-5 projects. There are only two partnerships with more than 10 projects, but also ones without any results.

Other outcomes that stand out are the matchmaking platforms and tools developed by two of the partnerships ('Space' and 'High Performance Production 3D Printing'), as these can further support value chain development, mobilisation of private funds and innovation. Based on the available information, these seem to be developed from other resources than EU funds. Further worth mentioning are the demo cases and the value chain generator platform developed by the 'Bioeconomy',

and the interregional hub of the 'Chemicals' partnerships, as well as the Joint Undertaking established under the 'Marine renewable energy', the public-private joint venture reported by the 'Digitalisation and Safety in Tourism' or the joint position paper developed by the 'Solar Industry Regions' partnerships. Such results nonetheless are rather exceptions than the norm. Other outcomes often reported are the organisation of or participation at events.

Table 1. Summary data on TSSP partnerships as of September 2024

No.	Name of partnership	Year	No. of regions involved	Out of which lagging regions with innovation performance	
				emerging	moderate
AGRI-FOOD PLATFORM PARTNERSHIPS					
1	Consumer involvement	2018	4	-	-
2	Food packaging	2022	19	2	-
3	High Tech Farming	2017	34	3	1
4	Ingredients for a Circular Economy (I4CE)	2018	12	-	1
5	Smart Sensors for Agri-food	2017	17	1	-
6	Traceability and Big data in the agri-food value chain	2016	33	6	2
ENERGY PLATFORM PARTNERSHIPS					
1	Marine renewable energy	2014	18	-	1
2	Sustainable buildings	2016	31	6	3
3	Bioenergy	2016	2	-	-
4	Solar Industry Regions (SIRE)	2017	7	1	2
INDUSTRIAL MODERNISATION PLATFORM PARTNERSHIPS					
1	Artificial Intelligence and Human Machine Interface (AI & HMI)	2018	17	-	1
2	Advanced Materials for Batteries for Electro-mobility and Stationary Energy Storage	2018	31	-	2
3	BERRY+	2020	13	1	4
4	Bioeconomy	2016	16	-	-
5	Chemicals	2018	8	2	-
6	Cultural and Creative Regional Ecosystems	2020	18	3	2
7	Cybersecurity Smart Regions	2018	10	-	-
8	Digitalisation and Safety for Tourism	2018	7	-	1
9	Efficient and Sustainable Manufacturing	2016	23	-	2
10	GO4Cosmetics	2021	9	3	2
11	High Performance Production 3D Printing	2014	31	-	2

12	Hydrogen Valleys S3 Partnership	2019	66	-	7
13	Medical Technologies	2019	26	3	1
14	S3P mining industry and global value chains	2019	13	3	1
15	New Nano Enabled Products	2015	6	-	-
16	Photonics	2017	16	2	-
17	Safe and Sustainable Mobility	2019	12	1	-
18	Smart Regional Investments in Textile Innovation	2016	13	1	2
19	SME integration for Industry 4.0	2016	8	1	-
20	Space	2021	9	-	2
21	Social Economy	2018	7	-	-
22	Clussport (sport & vitality)	2017	14	2	-
23	Interregional Partnership "Virtual and Smart Cultural Tourism" (VSCT Partnership)	2021	7	-	1
24	Water Smart Territories	2019	25	5	-
25	Wireless ICT	2020	2	-	-
SUSTAINABLE BLUE ECONOMY PLATFORM PARTNERSHIPS					
1	ADMA Energy	2014	9	-	1
2	Circular Smart Aquaculture	2023	6	-	-
3	Maritime Sustainable Blue Bioeconomy	2023	17	1	4

Source: Own compilation based European Commission (n.d.c), European Commission (2023) and Commission Implementing Decision (EU) 2021/1130 (European Commission, 2021)

Table 2. Lagging regions in TSSP partnerships

MS	No. of leg.reg/ TSSP partic.	Lagging region	Innovation performance	No. of partnerships	TSSPs*			
					IM	A	E	SBE
BG	5/2	BG34 Yugoitztochen	emerging	1	1			
		BG42 Yuzhen tsentralen	emerging	2		1	1	
CZ	4/3	CZ04 Severozapad	emerging	2	2			
		CZ05 Severocychod	moderate	3	2		1	
		CZ07 Stredni Morava	moderate	3	3			
EL	12/7	EL41 North Aegean	emerging	1	1			
		EL43 Crete	moderate	3	2			1
		EL51 Eastern Macedonia and Trace	emerging	1	1			
		EL53 Central Macedonia	moderate	1		1		
		EL53 Western Macedonia	emerging	4	2	1	1	
		EL63 Western Greece	moderate	2	2			
		EL 64 Central Greece	emerging	2	2			

ES	6/3	ES42 Castilla-La Mancha	emerging	1	1			
		ES43 Extremadura	emerging	3	1	2		
		ES61 Andalucia	moderate	6	2		3	1
HR	2/1	HR06 Sjeverna Hrvatska part of HR04 Kontinentalna Hrvatska	emerging	1			1	
IT	7/3	ITF 3 Campania	moderate	3	1		1	1
		ITF 5 Basilicata	moderate	1	1			
		ITG 1 Sicilia	emerging	1			1	
		ITG 2 Sardegna	emerging	2	1	1		
LV	1/1	LV00 Latvia	emerging	3	2	1		
HU	7/4	HU21 Közép Dunántúl	emerging	1		1		
		HU22 Nyugat Dunántúl	emerging	1	1			
		HU23 Dél-Dunántúl	emerging	2	1	1		
		HU32 Észak-Alföld	emerging	3	1	1	1	
PL	15/8	PL21 Malopolskie	moderate	6	4		1	1
		PL42 Zachodnipomorskie	emerging	1		1		
		PL52 Opolskie	emerging	1			1	
		PL63 Pomorskie	emerging	2	1		1	
		PL71 Lodzkie	emerging	1	1			
		PL81 Lubelskie	emerging	2	2			
		PL82 Podkarpackie	emerging	1			1	
		PL92 Mazowiecki regionalny	emerging	4	4			
PT	6/4	PT11 Norte	moderate	6	4		1	1
		PT15 Algarve	emerging	1			1	
		PT16 Centro	moderate	3	3			
		PT18 Alentejo	moderate	3	2			1
RO	8/3	RO11 Nord-Vest	emerging	3	2	1		
		RO12 Centru	emerging	1			1	
		RO21 Nord-Est	emerging	4	3	1		
SI	1/1	SI03 Vzhodna Slovenija	moderate	1	1			
SK	3/1	SK04 Vychodne Slovensko	emerging	1	1			

Note: * Industrial modernisation (IM), agri-food (A), energy (E), sustainable blue economy (SBE).
Source: Own compilation based on European Commission (n.d.c), European Commission et al. (2023) and Commission Implementing Decision (EU) 2021/1130 (European Commission, 2021).

4. Discussions

The number of partnerships registered on the four TSSPs has more than doubled since 2017, the year when the EC officialised interregional cooperation linked to smart specialisation. Ten of the new partnerships have registered in 2020, just before the start of the current programming period. Most partnerships are on the industrial modernisation platform, and these are also the ones involving a bigger number of

lagging regions. Such regions are now part of almost every partnership and their overall involvement has considerably increased. 14 lagging regions were involved in up to two partnerships at the beginning of the programming period (Woolford et al., 2021), and now 42 are engaged in up to six interregional initiatives. This means that the policy measures and incentives introduced starting with the 2021-2027 programming period, including the criteria set for the establishment of new partnerships have led to an increased involvement of lagging regions, but, also to an enhanced interest in the TSSPs on behalf of all types of regions. Some partnerships also include accession countries. This is an additional finding of the study. Their participation is probably attributable to the export of the smart specialisation approach outside the EU, as it was noted by Kruse & Wedemeier (2022).

Nonetheless, despite the policy measures and incentives introduced, lagging regions are still in minority on the TSSPs and almost half of these remain outside. On country level, it is approximately half of the lagging regions that participate, however there are exceptions. Lagging regions from more developed countries and from Bulgaria, Romania and Slovakia have a lower participation. The latter three countries are emerging innovators (European Commission, n.d.d), but so is Poland with a rather good regional participation on the TSSPs. The lagging regions that are most active on the platforms – Norte (Portugal), Malopolskie (Poland) and Andalusia (Spain) – are moderate innovators (European Commission et al., 2023). These results partially resonate with previous findings from the literature, according to which more advanced regions benefit more from interregional collaboration linked to research and innovation (Santoalha, 2018), but at the same time are somehow contradictory to it. The explanations might lay in the content of the S3 policies, institutional commitment, capacities (Uyarra et al., 2018) and characteristics, as well as in the quality of the regional systems (Woolford et al., 2021) and in the extent to which the entrepreneurial discovery is connected to actors and networks from the outside (Foray 2017; 2019). These would be worth of further investigation through document analysis and the collection of qualitative information. It would additionally be interesting to learn about how the regions that remain outside of platforms fulfil the specific criteria regarding interregional cooperation as included in Regulation (EU) 2021/1060.

Relevant quadruple helix actors, especially from the market and research side, are part of almost every partnership, even if in varying numbers. A wider geographical coverage of partnerships does not lead to a larger involvement of key actors. The number of stakeholders engaged is more likely to be connected to the manner in which these are involved in the S3 in each region, as well as the way in which they interact with each other. Many partnerships demonstrate links or cooperation with wider networks. Such relationship between TSSP partnerships and other collaborative structures was not highlighted in previous research. This is a valuable outcome as it contributes to the integration of innovation systems of

different types and on different levels (Asheim et al., 2011) and is attributable to the new criteria used by the EC to approve partnerships (European Commission, n.d.b).

Most partnerships manage to leverage funding especially from the Horizon and Interreg Europe programmes, the new I3 instrument, and other EU level funding sources (e.g. COSME, technical assistance). The results of the collaborations are primarily reflected in such projects. Other funding sources mentioned – like the Urbact or Permanent Structured Cooperation programmes and Erasmus+ - have not been included in previous studies amongst instruments dedicated to S3-related interregional cooperation. While obtaining funding from the first two programmes mentioned, may be specific to the partnerships' areas of interest, it is notable that some partnerships use Erasmus+. The development of skills and competencies, supported by this programme, falls in the scope of S3-related interregional cooperation (Hegyi & Rakhmatoullin, 2017), and can be especially beneficial for lagging regions (Sörvik et al., 2018).

The number of projects varies from one partnership to another and is not connected to the number of partners involved or the length of their cooperation. There could be partnerships involving 66 regions, but with only one project, or ones established as early as 2015 without any project financed. As there are several funding sources available, the inability of partnerships to capitalise on these might be due to their low capacity to attract funds or to a mismatch between the scope of the partnerships and that of the funding instruments. This might be the case with the Digital Europe programme, as well, which is not mentioned as a financing source by any of the partnerships, even though some of these focus on digitalisation and involve European Digital Innovation Hubs as partners. The latter are financed by this programme; thus, some complementarities might exist.

Only a couple of partnerships show the ability to also use the ERDF available under regional programmes. Some of these also managed to blend in financing from the Recovery and Resilience Fund or other sources. Apart from these exceptions, in general, synergies and complementarities between EU and regional funding is not used. This is rather intriguing, as many of the partnerships now involve businesses, business and innovation intermediaries, cluster organisations, universities and other research organisations that are eligible for research and innovation funding under the Cohesion Policy. Further research would be necessary to understand the underlying reasons, as there could be various explanations. One of these may stem from the way regional ERDF programmes are planned and implemented, without effectively permitting or encouraging such synergies and complementarities. Another could derive from the content of the action plans, as these could reveal how the partnerships plan to reach their objectives, considering or not the use of regional ERDF funding sources -, or how individual partners plan their regional S3 projects, prioritising or not the ones that contribute to the overall goals of TSSP partnerships. Finally, somehow connected to these, it could be a matter linked to the monitoring of

partnerships, and failure in gathering data and information about relevant projects from all partners involved.

Partnerships nonetheless report on Interreg A and B strand projects, which were already mentioned as funding sources used especially by lagging regions (Woolford et al., 2021). The additional finding of this study is that these Cohesion Policy programmes are also capitalised on by partnerships involving only more advanced regions. Considering the number of regions involved in most of the partnerships, and given the geographic area covered by these programmes, this suggests that some of the partners that are in geographic proximity cooperate more intensively within the larger partnerships. While cross-border cooperation programmes cover areas alongside national borders, transnational ones cover a greater number of regions from different Member States. The latter can also cooperate under the umbrella of a macro-regional strategy (European Commission, n.d.a; Gänzle, 2017; 2018). These strategies provide a framework for policy alignment, have networked governance structures that involve relevant key actors, and their action plans are periodically reviewed (Gänzle, 2017; 2018). The EUSBR was used in the previous programming period as a framework for the alignment of S3 objectives and the implementation of projects to support cooperation between less and more developed regions linked to smart specialisation (Woolford et al., 2021). One of the partnerships also includes amongst its members a macro-regional strategy as a wider network.

When it comes to other types of results, most partnerships refer to events and there are only a few mentioning demo cases, matchmaking platforms or other instruments and tools that further contribute to value chain development or to the mobilisation of investments in innovation. There is only one partnership mentioning a hub with interregional reach. Most of these have been developed with EU funding. This finding suggests that partnerships may be contingent on financing or primarily driven by funding opportunities. Both are at odds with the promotion of valuable cooperation between different regions that could result in the reduction of disparities between regions. The dependency on funding can lead to a fragmentation of results, as calls are competition based. Failure to attract funding, the right type of funding or all the necessary funding might negatively affect partnerships in reaching their objectives and contributing to the scope of S3-related interregional cooperation, such as value chain development, the demonstration, commercialisation and scaling up of innovations, the uptake of new technologies, or the complementary exploitation of capacities (Mariussen et al., 2019; Radosevic & Ciampi Stancova, 2018; Rakhmatullin et al., 2020). The same is true in case partnerships are created only to use funding opportunities instead of aiming to tackle joint challenges or exploit opportunities.

Conclusions

The paper investigated the impact of the newly introduced EU level policy measures and financial instruments on the problems linked to S3-related interregional cooperation that were previously highlighted in the literature, such as: the lack of involvement of lagging regions (Woolford et al., 2021), of businesses and business support organisations (Cavicchi & Ciampi Stancova, 2017), failure to exploit existing funding sources and leverage synergies and complementarities (Woolford et al., 2021). It additionally aimed to explore the results obtained by partnerships. Such a research inquiry was proposed by Uyarra et al. (2018).

The new measures and instruments have had a series of positive effects. The number of lagging regions involved in TSSP partnerships and the intensity of their involvement has raised considerably. Quadruple helix actors, including businesses and business support organisations are now part of almost every partnership. Many partnerships involve networks or cooperate with these. Except for a few, all partnerships use the available funding sources, especially from the EU level research and innovation framework programme and the new I3 Instrument. Partnerships also capitalise on the financing available under different Interreg programmes. Out of these, only Interreg Europe (the interregional programme) is considered a funding source for TSSP partnerships (Rakhmatullin et al., 2020), however, previous studies also referred to the use of Strand B and C programmes, especially by lagging regions (Woolford et al., 2021). Some partnerships also have Erasmus+ projects. This funding source was not mentioned previously in the literature; however, it is a positive result, as it can support one of the aims of interregional cooperation, which is the skill and competence development linked to smart specialisation (Hegyi & Rakhmatoullin, 2017). Another additional finding of the study is that the accession countries are also involved in TSSP partnerships.

Apart from these positive developments, the interregional cooperation connected to smart specialisation through TSSP partnerships continues to present some weaknesses. Lagging regions, that should benefit the most from such collaborations are still in a minority on the platforms. The lagging regions from more developed countries (France and Belgium) are not participating at all. The ones from Romania, Bulgaria and Croatia have a lower involvement compared to those from other Central and South European countries. Most of the results of the partnerships are represented by projects financed from EU funds, so these may be dependent on funding or are only driven by the availability of financing. There is a limited number of partnerships that also reports on projects financed from regional Cohesion Policy programmes or from other sources. Despite the focus of some partnerships on digitalisation, the Digital Europe Programme is not used as a funding source. A couple of partnerships have no results.

Interregional cooperation linked to smart specialisation can bring benefits for all types of regions, regardless of their development level (Iacobucci & Guzzini,

2016). It is especially relevant for lagging regions as it can support their economic development (Asheim et al., 2016; Balland & Boschma, 2021; Belussi et al., 2018; Boschma & Iammarino, 2009; Foray, 2019; Isaksen & Trippl, 2017; Kruse & Wedemeier, 2022; Miguélez & Moreno, 2015; Neffke et al., 2017; Wolford et al., 2021) and contribute to the reduction of interregional disparities within the EU, which is the aim of the Cohesion Policy. It can also support the alignment between EU and regional policies and strengthen the links within wider European networks which, according to Asheim and Herstad (2021) and Draghi (2024), represent future orientations connected to research and innovation policies.

TSSPs and the collaboration on these should be further improved. There would be a need for more qualitative research to formulate specific recommendations linked to how this should be done. Such research should focus on a more in-depth analysis of the action plans prepared by partnerships; on the way they perform monitoring and effectively integrate all members in the implementation of the plans to overcome joint challenges or to exploit innovation opportunities. There could be a specific focus on the most advanced and less successful partnerships, as well as on the most and least active lagging regions also in terms of capacities, the content of their S3s, and the way they organise the entrepreneurial discovery. The reasons behind the failure of partnerships to use regional ERDF funding in synergy and complementarity with EU level instruments should also be analysed, as well as the lack of use of some available instruments, like the Digital Europe Programme.

Further support for S3-related interregional cooperation could come under the umbrella of macro-regional strategies. These cover several NUTS2 regions from various EU and non-EU countries, and with different development levels, connected by shared challenges and history (Capello & Cerisola, 2019; European Commission, n.d.a; Gänzle, 2017; 2018; Woolford et al., 2021). They provide a framework for policy alignment and rely on wide stakeholder involvement (Gänzle, 2017; 2018; Woolford et al., 2021) and can contribute to the reduction of disparities through the complementary use of resources (Capello & Cerisola, 2019; 2020). The macro-regional strategies already cover the Danube, Baltic, Alpine, Adriatic and Ionian regions (European Commission, n.d.a) and a strategy for the Mediterranean is under preparation (CPRM Intermediterranean Commission, 2024). The action plans supporting their implementation are constantly reviewed and adjusted (Gänzle, 2017; 2018). Geographic and cultural proximity is a driver of interregional collaboration linked to research and innovation (Balland & Boschma, 2021; Boschma & Iammarino, 2009; Wolford et al., 2021). These also support the development of value chains (Antràs & de Gortari, 2020; Doan, 2023). Thus, more enhanced links between macro-regional strategies and regional S3s could be mutually beneficial. If support for interregional cooperation linked to smart specialisation would become part of the macro-regional action plans, the competitiveness of these wider regions could be further increased and the disparities

within these could be further reduced, strengthening, at the same time, the outward looking dimension of smart specialisation.

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