European Commission

JRC SCIENCE FOR POLICY REPORT

Assessing Smart Specialisation:

MONITORING AND EVALUATION SYSTEMS

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2021

Joint Research Centre

EUR 30654 EN

EU Science Hub
https://ec.europa.eu/jrc

JRC123734

EUR 30654 EN

PDF ISBN 978-92-76-32592-5 ISSN 1831-9424 doi:10.2760/443642

Luxembourg: Publications Office of the European Union, 2021

How to cite this report: Hegyi, Fatime Barbara and Prota, Francesco, Assessing Smart Specialisation: Monitoring and Evaluation Systems, EUR 30654 EN, Publications Office of the European Union, Luxembourg, 2021, ISBN 978-92-76-32592-5, doi:10.2760/443642, JRC123734.

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Abstract

Besides providing a literature review on monitoring and evaluation of Smart Specialisation, this publication offers an overview of a research project run by the Smart Specialisation platform to gain insight on the Smart Specialisation policy experience across the EU in its 7th year of implementation. In particular, this project has analysed whether the principles of Smart Specialisation as regards to monitoring and evaluation hold true in practice from the experiences gained during the 2014-2020 programming period. Thus, our analysis aims to evaluate the efficiency and effectiveness of monitoring and evaluation systems of national and regional authorities implementing Smart Specialisation strategies. In addition, based on the literature review and on the evidence gathered by the project, this publication draws some policy lessons with reflections for the 2021-2027 European Union Cohesion policy as regards to monitoring and evaluation.

The importance of assessing the experience of the 2014-2020 programming period and the approach adopted by national and regional authorities in charge of Smart Specialisation derives from the consideration that Smart Specialisation has been the largest place-based policy experiment attempting to boost economic growth through prioritisation of research and innovation domains and through diversification. Smart Specialisation has been defined as an ex-ante conditionality for using European Development Funds (ERDF) under Thematic Objective 1 (research and innovation). Over 120 Smart Specialisation strategies have been implemented during the 2014-2020 programming period, having had guided the investment of over EUR 40 billion from ERDF (over EUR 65 billion including national co-financing).

Various sources of primary information have been used to perform this analysis: a survey addressed to S3 implementing authorities, analysis of implementation measures and case study reports. Out of the 120 existing Smart Specialisation strategies, the survey has been filled out by 79 national or regional implementing authorities from nineteen countries while the case studies cover thirteen regional and 4 national strategies and their implementation practices. Four main themes have been explored besides this publication: impact of smart specialisation on the governance of research and innovation policy systems (Guzzo and Gianelle), entrepreneurial discovery process (Perianez-Forte and Wilson, 2021) and policy implementations (Gianelle et al., 2021).

From the evidence on monitoring and evaluation, we could deduct that Smart Specialisation represent a cultural change for most regions, whether developed and already well acquainted with regional innovation policy practices or less developed with lower innovation performance. Still, the practice of policy monitoring and evaluation continues to lag behind, which in turn limit learnings and an updated strategy that is based on S3 policy outcomes and impact. It is necessary to identify a dedicated team responsible for S3 monitoring and evaluation within the public administration (equipped with adequate human and financial resources), in order to have an evaluation of the S3 results and the effectiveness of the policy intervention logic. In order to support evaluation activities, it is important to collect data relating to the behaviour of innovation actors, even those not represented in regional calls. While in view of the next programming period, it is necessary to make use of analytical and informative tools (big data, web semantics, etc.) able to provide different kind of data and faster return.

Acknowledgements

This report is part of a research project conceived and managed by the JRC staff: Carlo Gianelle (research project coordinator), Fabrizio Guzzo, Fatime Barbara Hegyi, Inmaculada Perianez-Forte. The project was co-financed by the European Commission's Directorate-General for Regional and Urban Policy (DG REGIO) in the context of the Smart Specialisation Platform activities. It was supported by an international network of experts: Laura Polverari (University of Padua, Italy), James Wilson (Orkestra – Basque Institute of Competitiveness and Deusto University, Spain), Ugo Fratesi, Polytechnic University of Milan, Italy), Maja Buçar (University of Ljubljana, Slovenia), Lajos Nyiri (Hungary), Federica Bertamino (Agency for Territorial Cohesion, Italy), Emanuele Fabbri (Tuscany Region, Italy), Ana Fernandez Zubieta (Complutense University Madrid, Spain), Ricard Esparza Masana (Autonomous University Barcelona, Spain), Krzysztof Mieszkowski (Warsaw Technical University, Poland), Antti Mäenpää (Vaasa University, Finland), Jens Sörvik (Skane region, Sweden), Alexander Kleibrink (Federal Ministry for Economic Cooperation and Development, Germany). It benefited from the constant support of Alessandro Rainoldi (Head of the territorial Development Unit of the JRC), and Manuel Palazuelos (team leader of the Smart Specialisation Platform), and Sylvie Foucault and Els De Rademaeker on the administrative side. The authors would like to thank to all the above mentioned people for their contribution and assistance to the development of the research project and to this report in particular. Special thanks go to Peter Berkowitz (Head of the Competence Centre on Smart and Sustainable Growth of DG REGIO) for supporting and co-financing the project.

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Executive summary

The Smart Specialisation policy experiment has reached its seventh year of implementation, marking the end of the 2014-2020 programming period. Smart Specialisation has been defined as an ex-ante conditionality for using European Development Funds (ERDF) under Thematic Objective 1 (research and innovation). Over 120 Smart Specialisation strategies have been implemented during the 2014-2020 programming period, having had guided the investment of over EUR 40 billion from ERDF (over EUR 65 billion including national co-financing). This assessment provides an insight in terms of efficiency and effectiveness of monitoring and evaluation systems of Smart Specialisation policy implementation and draws some policy lessons with reflections for the 2021-2027 European Union Cohesion policy.

Research questions. This publication assesses to what extent does Smart Specialisation monitoring and evaluation systems allow and contribute to a cyclical policy learning process for improved policy design and mechanisms and if they are able to measure the socio-economic-environmental impact of Smart Specialisation related interventions. Furthermore, the publication analyses if Smart Specialisation monitoring and evaluation systems collect, organise and convey information about the development of the policy interventions in a way that they provide, manage and use data that contributes to evidence-driven policy. Lastly it analyses if the methodological approach adopted in the Smart Specialisation strategy suited for an overall evaluation of the whole S3 strategy.

Data Sources. Various sources of primary information have been used to perform this analysis: a survey addressed to S3 implementing authorities, analysis of implementation measures and case study reports. Out of the 120 existing Smart Specialisation strategies, the survey has been filled out by 79 national or regional implementing authorities from nineteen countries while the case studies cover thirteen regional and 4 national strategies and their implementation practices.

Importance of assessing Smart Specialisation monitoring and evaluation systems: Integrated monitoring and evaluation system of policy cycles enhance the learning capacity of the system and allow to better embrace and meet the needs of broader groups of society. Therefore, efficient monitoring and evaluation systems call for mechanisms capable of mapping and engaging relevant stakeholders. Despite the acknowledged role and the rationale of a monitoring and evaluation system for a Smart Specialisation strategy, little has been done so far about it, in particular with regard to evaluation, which can be seen as the "Cinderella" of this policy.

Policy recommendations: In the view of the next programming period, a new cultural change as regards to Smart Specialisation policy monitoring and evaluation mechanisms would enable to forge ahead in the backwardness of monitoring and evaluation practices. Several policy recommendations have been formed based on survey results and the case studies. Survey results show that the indicators of the monitoring system are to be strongly linked to Smart Specialisation priority areas. Furthermore, it is necessary to identify a dedicated team responsible for S3 monitoring and evaluation within the public administration (equipped with adequate human and financial resources), in order to have an evaluation of the S3 results and the effectiveness of the policy intervention logic. In order to support evaluation activities, it is important to collect data relating to the behaviour of innovation actors, even those not represented in regional calls. Behavioural insights help to understand implementation processes of change enabling possible revisions of previous strategic decisions taken. While in view of the next programming period, it is necessary to make use of analytical and informative tools (big data, web semantics, etc.) able to provide different kind of data and faster return. Lastly, putting in place efficient processes for feedback from evaluators to policy makers, throughout the programme implementation improves the use of monitoring and evaluation practices throughout the whole policy cycle.

1. Introduction

The notion of Smart Specialisation (S3) was developed as an academic concept in the mid- to late 2000s and it originated in the literature analysing the productivity gap between the United States and Europe (McCann and Ortega-Argilés, 2015). Since then, the economic literature has devoted significant attention to S3 and to related regional policies (see, for example, Foray 2015; Foray et al., 2015; McCann, 2015; Kroll, 2019a; Hassink and Gong, 2019; Gianelle et al., 2020). According to Asheim et al. (2017), "Smart Specialisation is probably the single largest attempt ever of an orchestrated, supranational innovation strategy to boost economic growth through economic diversification". It represents an explicit, placed-based approach, emphasising prioritisation and selectively through non-neutral, vertical policies (Foray et al., 2011, Kyriakou et al, 2019).[1]

The Smart Specialisation approach was integrated into the reformed cohesion policy for 2014-2020 programming period. In particular, the definition of S3 agendas were established by the European Commission as a thematic ex ante conditionality for all investment priorities under Thematic Objective 1. Smart Specialisation now represents the reference framework for innovation policy in Europe and, therefore, there is a widespread need for an appraisal of its achievements.

In 2020, the research project developed by the Joint Research Centre explored four main themes. While this present publication is focusing on the assessment of monitoring and evaluation, Guzzo and Gianelle have assessed the impact of smart specialisation on the governance of research and innovation policy systems (Guzzo and Gianelle, 2021). Perianez-Forte with Wilson have assessed the impact of the entrepreneurial discovery processes (Perianez-Forte and Wilson, 2021), while the analysis of policy implementations has been accomplished by Gianelle et al (Gianelle et al., 2021).

Despite the acknowledged role and the rationale of a monitoring and evaluation system for a Smart Specialisation strategy, little has been done so far about it, in particular with regard to evaluation.[2] Indeed, evaluation is the "Cinderella" of this policy. As Esparza highlights it, the lack of complete overview of the reality of S3 implementation, which in turn limit the possibilities of improvements as regards to the S3 strategies of the programming period 2021-2027 (Esparza-Masana, 2021).

For the programming period 2014-2020, while the presence of a monitoring mechanism is one of the elements needed to validate the proposed S3, evaluation is not explicitly mentioned. In the absence of any need for regulatory compliance, regions must judge by themselves whether to complement their S3 monitoring activities with evaluation.[3] The choices of the regions were very different, as underlined in this report.

A greater attention to monitoring rather than evaluation can also be found in the literature (see, for example, Gianelle and Kleibrink, 2015; Gianelle et al., 2016; Kleibrink et al., 2016; Marinelli et al., 2019; Masana and Fernández, 2019). Indeed, we have a bulk of knowledge about S3 monitoring models; on the contrary, the attempts to carry out evaluation of the S3 of European regions have been scant so far. There is no agreement about how to evaluate the effectiveness of the Smart Specialisation strategies and about which methodology is more suited to this end.

According to Molas-Gallart and Davis (2006), "the practice of policy evaluation continues to lag behind in innovation theory, which has produced successive generations of more sophisticated conceptual models

[1] The underlying idea is that "regions cannot do everything in science, technology and innovation and [...] they should promote what should make their knowledge base unique and superior" (Foray et al., 2011).

[2] A solid Smart Specialisation monitoring and evaluation framework is a necessary tool that can help policymakers and practitioners ensure the effectiveness of S3 implementation. The S3 monitoring and evaluation framework allows policymakers to monitor the progress and to evaluate the outcomes and impact of ongoing policy actions, resulting in a cyclical policy learning process.

3 In the European Commission's proposal for the programming period 2021-2027, good governance of national or regional Smart Specialisation strategy is included as an enabling condition and "monitoring and evaluation tools to measure performance towards the objectives of the strategy" are listed in the fulfilment criteria. S3 evaluation seems to be explicitly on the agenda.

that seek to explain how the relationship between scientific and technological research and the market opportunities for innovation occurs". The specific features of Smart Specialisation strategies accentuate the need for exploring new approaches to evaluation.

2. Main challenges in monitoring and evaluating Smart Specialisation Strategies

Challenges for S3 monitoring and evaluating arise from the distinctive elements of these strategies and especially from the novelty of S3 approach as regards to the entrepreneurial discovery process.

As Smart Specialisation strategy is an example of a complex innovation strategy in which instruments derived from different theoretical logics coexist, while a wide range of regional stakeholders from the quadruple helix of government, business, research and civil society are involved (McCann and Ortega-Argilés, 2014). Smart Specialisation strategies, therefore, take place in a pluralistic governance context. This implies that the monitoring and evaluation process is required to embrace and meet the needs of broader groups in society, on which policies can have varied impact (Barnes et al., 2003). This calls for mechanisms capable of mapping relevant stakeholders and engaging directly with them (Rakhmatullin et al., 2020) and measuring progress towards new industrial systems towards redefined labour markets that are more resilient towards social, economic and environmental changes (Esparza-Masana, 2021).

In addition, the usefulness of single evaluations of the effectiveness of individual instruments is highly questionable in this multi-rationales, multi-level, multi-actor policy context (Magro and Wilson, 2013). Recognizing the increasing complexity associated with innovation policies makes apparent the need for system-wide evaluation exercises that measure the effectiveness of the overall strategy (Feller, 2007). This means taking into account changes in behaviour of actors that have not been supported by policy measures included in the strategy, not only changes of behaviour in the target groups of the various interventions, as well as the presence of multiple operating and interacting interventions which create difficulties identifying the effects of one intervention over another.

The entrepreneurial discovery process, with its experimental nature, adds further complexity. As well known, entrepreneurial discovery process is not just a process referred to the identification of investment-priorities on research and innovation (priority-areas) and to explore new techno-economic opportunities thanks to stakeholders' engagement, but it is a social and political process, where issues such as power, vested interests of different groups, etc., need to be taken into account (Magro and Wilson, 2019). In addition, as highlighted in Marinelli and Perianez Forte (2017), conceptually the entrepreneurial discovery processes (EDP) has evolved from being an element of the design-phase of a smart strategy into a continuous activity. In terms of evaluation methodology this entails moving from traditional approaches towards participatory approaches in which the focus is on supporting the learning capacity of the system by strengthening feedback loops and improving access to information.

Other challenges for evaluation relate to uncertainty in the nature and timing of impacts arising from interventions and to the necessity to pay particular attention to context since economic and innovation systems are different over time and space.

Finally, since policymakers need accurate and real-time input in order to assess socio-economic problems and propose effective strategies for tackling them, evaluation should occur concurrently alongside programme development and implementation (Barnes et al., 2003).

3. The early warning system of policy implementation

A sound S3 monitoring system 'acts as early warning mechanism signalling critical aspects of policy implementation' that provide inputs for S3 evaluation. S3 evaluation is only possible if there exist a clear interventions logic that links 'ends with means' (Gianelle et al., 2019). This requires a monitoring and evaluation (M&E) system in place that collects and manages accurate, complete and relevant data that drives data- and evidence-driven decision making. Our research project intended to examine to what extent regional and national M&E systems of S3 have fulfilled this promise. Furthermore, based on the evidence gathered we highlight the main challenges that implementing authorities face as regards to such M&E systems.

While supporting the re-examination or validation of earlier policy decision and the advancement as regards to strategic objectives, the M&E framework enables policymakers to bring better informed decisions when determining the impact and effectiveness of a policy program (OECD, 2009). Hence, in line with the European Commission's Smart Specialisation Implementation guide, monitoring and evaluating the implementation of innovation policies contribute to minimising duplication and fragmentation of efforts, while providing policy evaluators a basis for comparison and benchmarking of policies and policymakers a basis for preparing for the next programming period (Gianelle et al., 2016).

In the following two section we provide a review of the literature on S3 monitoring and evaluation.

3.1. Literature review of S3 monitoring

So far the role of monitoring in the Smart Specialisation framework has been widely discussed and attracted the attention of policymakers and bureaucrats.[4]

It is now clear that monitoring is not just a list of indicators and a set of procedures to gather data, analyse them and deliver periodic reports but rather it is a management tool which offers a "comprehensive transformational agenda for the way territorial innovation policies are conceived and implemented" (Kleibrink et al., 2016).[5] M&E systems need to be able to measure direct results of instruments and projects, the S3 process and the impact of the strategy (Esparza-Masana, 2021).

Several papers have discussed the different functions monitoring has within the context of Smart Specialisation.[6] Gianelle and Kleibrink (2015) argue that S3 monitoring mechanisms serve to inform the achievements and progress of the strategy - including the socio-economic impacts of the strategy - to enable policymakers to bring informed decisions and to enhance the logic of intervention of the strategy, while supporting a wide stakeholder involvement. According to Kleibrink et al. (2016), monitoring activities have to integrate strategic functions as regards to evidence-based policy, including the production of information for effective decision making and keeping stakeholders informed and engaged throughout the policy cycle (Magro and Wilson, 2015). It is also important that monitoring is used as a tool for the implementation of S3 that allows the adjustments of policy actions in a timely manner

[4] See, for example, the Massive Open Online course on Monitoring Smart Specialisation produced by the Territorial Development Unit of the JRC (https://s3platform.jrc.ec.europa.eu/monitoring).

[5] With regards to indicators Gianelle *et al.* (2016) state that each S3 priority area must have its own set of indicators and all indicators are meant to track the achievement of predefined objectives. Moreover, they identify five categories of indicators: output (measuring the direct output produced by funded projects along S3 priority areas); result (measuring the degree of achievements of socio-economic-environmental objectives of each S3 priority area); implementation (measuring the actual state of implementation of related policies and actions); structural change and specialisation (measuring the changes in the production systems by each S3 priority); context (measures territorial competitiveness, changes in the research and innovation system and the evolution of productions systems).

[6] "Whilst the importance of monitoring within RIS3 [Research and Innovation Strategies for Smart Specialisation] is broadly understood, the task of setting up a monitoring system is perceived as particularly challenging by national and regional authorities" (Marinelli *et al.*, 2019).

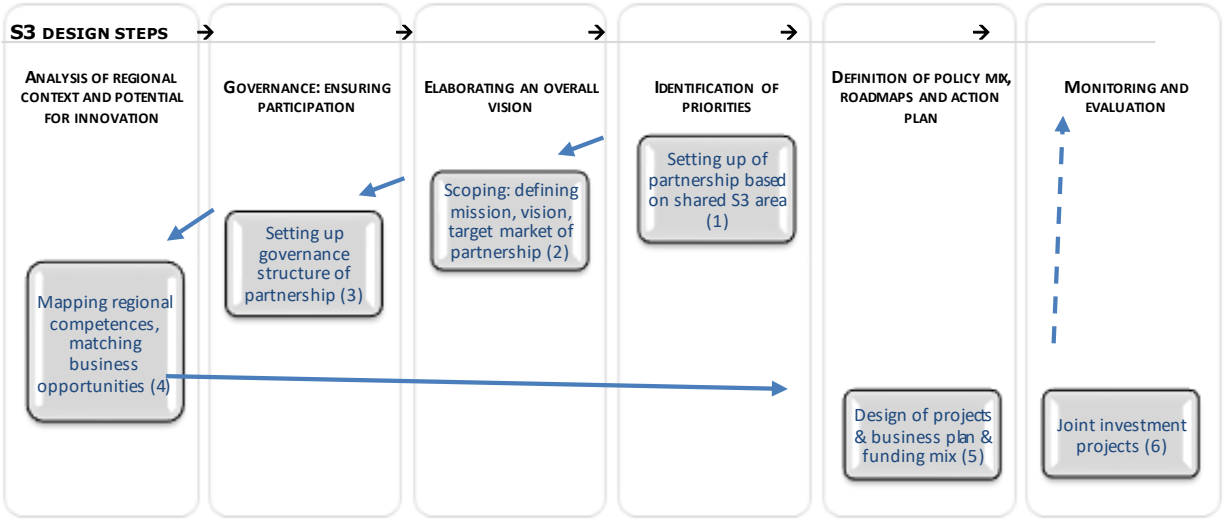
(Gianelle et al., 2016), thus "effectively supporting policy learning that render the policy cycle sustainable and self-correcting" (Kleibrink et al., 2016).

In the light of the plurality of agents from the quadruple helix of government, business, research and civil society involved in the policy process surrounding Smart Specialisation strategies and, in particular, in the entrepreneurial discovery process, Marinelli and Perianez-Forte (2017) and Masana and Fernandez (2019) stress the importance to involve all the relevant stakeholders also in S3 monitoring activities and to add a strategic learning component to the monitoring model. It is the S3 logic that requires the monitoring system itself to be a dynamic learning process. According to Masana and Fernandez (2019), a Smart Specialisation strategy monitoring model should be based on the following three axes: "(1) measuring the output of the strategy, monitoring the use and the outputs of the public investments; (2) studying the evolution of the specialisation domains that were selected under the EDP at the design phase of the strategy; and (3) examining the further implications of the strategy implementation on the different agents involved, from the public administration to the beneficiaries".

Marinelli et al. (2019) analyse how European regions and countries have developed the S3 monitoring system based on the evidence collected from a survey and peer-review exercises and workshops carried out by the Territorial Development Unit of the JRC in 2018. Their results highlight various challenges related to S3 monitoring: the difficulty of translating "the very S3 essence into a set of indicators that mirror the intervention logic" besides the difficulties of gathering adequate data; the identification and continuous engagement of stakeholders; the lack of adequate coordination structures and political support which also limit the effectiveness of the strategies themselves.

The effectiveness of monitoring activities needs to be strengthened in many cases. Joint activities can help European regions. European regions are increasingly tackling new and ambitious experimental policy measures together to test new policy support instruments while sharing the overall risk and uncertainty associated with such experiments (Hegyi and Rakhmatullin, 2020). The thematic S3 platforms offer a framework for regional and national Smart Specialisation programmes by facilitating collaboration between firms and clusters, enabling access to the innovative technologies and market opportunities (Hegyi and Rakhmatullin, 2017; Rakhmatullin et al., 2020). Mariussen et al. (2019) have developed a framework for the integration of methodologies of S3 design and the thematic S3 approach, claiming that the outcomes of the collaborative efforts thematic S3 partnerships feed back into the overall monitoring system of S3, thereby validating previous strategic decisions.

Figure 1 Thematic Smart Specialisation approach feeding back to overall monitoring system of S3



Source: Mariussen et al. (2019)

3.2. Literature review of S3 evaluation

To the best of our knowledge there are very few studies concerning evaluation of the smart strategies both theoretically and empirically. We can classify the current works in three groups.

The first group of papers is about how the S3 approach has been operationalized. The research question addressed is the following: are the choices made by regional policymakers coherent with the theoretical inspiration of S3?

D'Adda et al. (2019a), D'Adda et al. (2019b) and Marrocu et al. (2020) explore the importance of the related variety in the implementation of S3. The motivation is that the EU guidelines for S3 design explicitly mention the concept of relatedness as one of the main criteria to take into account in choosing the specialisation domains. The emphasis on related variety in S3 policy is not surprising since technological relatedness has become a central concept in the literature about innovation and regional development: it may promote innovation and facilitate diversification (Boschma and Frenken, 2011a; Boschma and Frenken, 2011b; Balland et al., 2019). The idea that there is a connection between the concepts of Smart Specialisation and related variety at the regional level is also in Boschma and Gianelle (2014).

D'Adda et al. (2020) assesses to which extent Italian regions have chosen S3 technological domains with a high degree of relatedness. Their results indicate "that in choosing S3 specialisation domains regions paid more attention in selecting those in which they had an actual strength rather than selecting a set of domains with the aim to maximize the degree of relatedness between them" (D'Adda et al., 2020). The level of coherence between the technological domains chosen by Italian regions and those in which they show an effective Specialisation, as measured by patenting activity, is assessed in D'Adda et al. (2019).[7] The authors find that Italian "regions have fulfilled the basic requirement of S3 in choosing a narrow set of technological domains in which to specialize" (D'Adda et al., 2019), but the variation of the coherence indicators between regions is high.[8] The choice of a large span of Specialisation can be problematic in the case of smaller or less-developed regions.

Marrocu et al. (2020) extend the analysis by assessing the coherence of the choices made by a large sample of European regions in moving from theory to practical implementation of S3 policy. Interestingly, the authors describe the current pattern of regional economic Specialisation by computing the revealed comparative advantage index based on employment, across 2-digit economic sectors. Their results indicate that, on average, regions have only partially targeted sectors in which they have an existing competitive advantage or the potential to develop comparative advantage as indicated by relatedness density measures. This could prevent the possibility of activating successful growth trajectories that leverage existing capabilities as suggested by the S3 approach.

All three of these papers provide interesting methodological input that could be used in a monitoring and evaluation system in order to measure how S3 policies have been implemented.

Gianelle et al. (2020) confirm the difficulties the regions face in implementing the highly selective Smart Specialisation approach.[9] The authors collect a huge evidence on policy implementation based on 39 regional and national Smart Specialisation strategies in Italy and Poland, and 285 calls for proposals employing ERDF Thematic Objective 1 resources, launched under 46 ERDF Operational Programmes in

[7] The authors of both papers (D'Adda *et al.*, 2019; D'Adda *et al.*, 2020) use patents to measure regional innovative capabilities and technological specialisation. Although patents are widely used in the economic literature as indicators of innovation, they have significant drawbacks: excessive emphasis on the technological aspects of S3 in spite of other relevant dimensions of innovation, under-representation of sectorial specialisations in traditional sectors, minor significance in less developed regions.

[8] The authors compute three indices of coherence: the first is based on the revealed comparative advantage (RCA), the second on the RCA and a positive trend measure, the third on a measure of "absolute" strength.

[9] The existence of these difficulties is confirmed also by Di Cataldo et al. (2020). According to the authors, S3 strategies include far too many axes of intervention and are, by and large, loosely connected with the strengths and specialisation of each region, rather they mimic what neighbouring areas are doing.

Italy, Poland, Portugal, Czechia, Hungary, Lithuania and Slovenia between 1 January 2014 and 31 December 2016. According to their results, there seems to be "signs that regions and countries have put in place mechanisms that can circumvent the very rationale of Smart Specialisation. This could be the result of lobbying activities, higher political return from widespread public support measures, risk-averse attitude of policymakers, and lack of adequate institutional and administrative capacity [...]. An additional explanation may lie in the incentive structure established at European Union [which makes it difficult] to reconcile [...] the experimentalist approach and intervention logic of Smart Specialisation with the requirements established by Cohesion Policy regulations" (Gianelle et al., 2020).[10]

The second group of papers includes the first impact evaluation exercises. Barbero et al. (2020), using a dynamic multi-regional computable general equilibrium model (the RHOMOLO model), present the results of an *ex ante* evaluation of the Smart Specialisation policy impact in Southern European regions. The authors provide estimates of the macroeconomic effects induced by the achievement of the targets established for the result indicators related to the ERDF Thematic Objective 1. These estimates can be interpreted as upper bounds of what could happen if the S3 policy intervention is fully accomplished. "The model simulations show overall positive effects of the Smart Specialisation policy on all the main economic indicators and sectors in the regions under scrutiny, where a peak in the economic activity is reached at the end of the ERDF financial period, when the policy objectives are fully accomplished" (Barbero et al., 2020).

Varga et al. (2020a) and Varga et al. (2020b) also adopt a modelling perspective. Varga et al. (2020a) develop an extension of the Geographic Macro and Regional (GMR)-Europe model in order to include entrepreneurship (measured by the regional entrepreneurship and development index) and interregional network policies (measured by EU Framework Program network participation), which, according to the authors, are focal points of Smart Specialisation policies.[11] The simulations, performed on a sample of six European regions (Karlsruhe region in Baden-Württemberg, Dresden in Saxony, Pomerania, Lithuania, Northeast Romania, Southern Transdanubia), suggest that targeting regional entrepreneurship and external knowledge development in a Smart Specialisation policy is not equally successful in all regions being influenced by several interrelated factors such as the level of entrepreneurship in the region, the embeddedness of the region in interregional knowledge networks, the magnitude of policy shocks, the size of R&D and human capital together with further dynamic effects generated by the policy shocks. Varga et al. (2020b) apply a version of the GMR models for Hungary in industrial sectors prioritization exercises. The authors model two dimensions suggested by Foray (2015) for prioritization: spill-over potential and economic significance. The simulations, carried out for three Hungarian NUTS 3 regions with significantly different economic potentials: Budapest, Győr-Moson-Sopron and Baranya, indicate different industries that show good potentials for Smart Specialisation policy.

Policy impact models, which calculate the economic impacts of different policy interventions, can be a useful tool in the S3 policy design phase (*ex-ante* impact assessment) in order to inform about which policy mix works better and how it may need to be adapted to different regional contexts.

Rigby et al. (2019) adopt a different perspective. They do not directly evaluate the S3 policy impact, but they test the proposition in Balland et al. (2019) that ideal local growth strategy involves expanding into complex activities related to existing local competencies, by analysing whether European city-regions that followed a path of technological development consistent with smart strategy policy experienced faster employment and gross domestic product growth.[12] Their results confirm the hypothesis: European cities following knowledge development trajectories that are closer to the Smart Specialisation approach experience a better economic performance than cities that do not. This seems to suggest that Smart

[10] The criteria proposed by the authors for the identification of Smart Specialisation policy interventions could also be used in the impact evaluation of the strategy.

[11] GMR models are built around three interconnected model blocks: the total factor productivity (TFP), the spatial computable general equilibrium (SCGE) and the macroeconomic (MACRO) model blocks. GMR models provide national and regional-level impact estimates; they also incorporate geographic effects (e.g., agglomeration, interregional trade, migration).

[12] Balland *et al.* (2019) propose a framework for analysing Smart Specialisation that connects the principle of relatedness to the concept of complexity.

Specialisation policies that assist regions to diversify their knowledge cores into related and more complex technological fields might generate gains in economic performance.

The third group of papers includes a few theoretical contributions on how to evaluate smart strategies. There is widespread agreement in the economic literature on the increasing complexity associated with innovation policies (Laranja et al., 2008; Flanagan et al., 2011; Magro and Wilson, 2013; Martin, 2016), but we lack any agreed-on approach on how to evaluate such complex innovation strategies. Current evaluation practice continues to adopt mostly simple models of impact assessment and accountability, largely based on a linear inputs-outcome-outputs-impacts logic, which tends to oversimplify the complex relationships between actors and other forces contributing to innovation. Mainstream evaluation models are unsatisfactory since they lack the systemic properties and fail to consider the non-linear and multi-directional nature of relationships between the initiative and its outcomes. These elements are relevant for the evaluation of Smart Specialisation strategies.

Kroll (2019b) highlights how without understanding to what extent increasingly ambitious goals in the areas of innovation policy result in practical implementation, and where this fails, it will remain difficult to adequately evaluate the far-reaching, transformative innovation strategies such as S3. To this end the author proposes a process-oriented approach which allows to move beyond a generic, outcome-oriented assessment comparing objectives and results directly to one of multi-level processual consistency and coherence.

Magro and Wilson (2019) analyse the interaction between governance processes and policy mix evaluation in the specific context of Smart Specialisation strategies. They emphasize that moving from individual policy evaluation to policy-mix evaluation increases the importance of evaluation governance. In addition, given the presence of multiple actors with a stake in research and innovation policy, both within government and outside government, the authors state that "a framework for evaluating policy mixes in the context of Smart Specialisation strategies should be explicitly aware of [vested interests and potentially conflicting among different regional actors] and should explicitly seek to overcome the m through fostering processes of social learning". This implies changing the paradigm and shifting from an accountability role of evaluation to a formative, strategic one. In other words, evaluation should become a powerful source of change and contribute to promote social learning capabilities.

Finally, the idea to complement traditional evaluation approaches is also in Prota (2019). In this paper the author suggests that complexity theory may provide a useful conceptual framework for economic evaluation in innovation, as complexity thinking foregrounds concepts of self-organization, emergence, non-linearity, uncertainty and co-evolution, which can help in the understanding of innovation systems functioning and, therefore, in the evaluation of innovation policies impact. In particular, according to Prota (2019) an evaluation approach drawing on ideas of complexity, which could be particularly well matched to the modern conception of innovation policy, is the developmental evaluation (Patton, 2011; Patton et al., 2016).[13]

[13] For a proposal of adapting the developmental evaluation approach to the specific features of Smart Specialisation strategy see the conference paper presentation *A smart answer to a complex question: Applying complexity theory to the evaluation of Smart Specialisation Strategy* available at http://3ftfah3bhjub3knerv1hneul-wpengine.netdna-ssl.com/wp-content/uploads/2018/09/GrisorioProta2018_presentation.pdf.

4. From theory to practice: an empirical investigation on research on Smart Specialisation monitoring and evaluation experiences across Europe

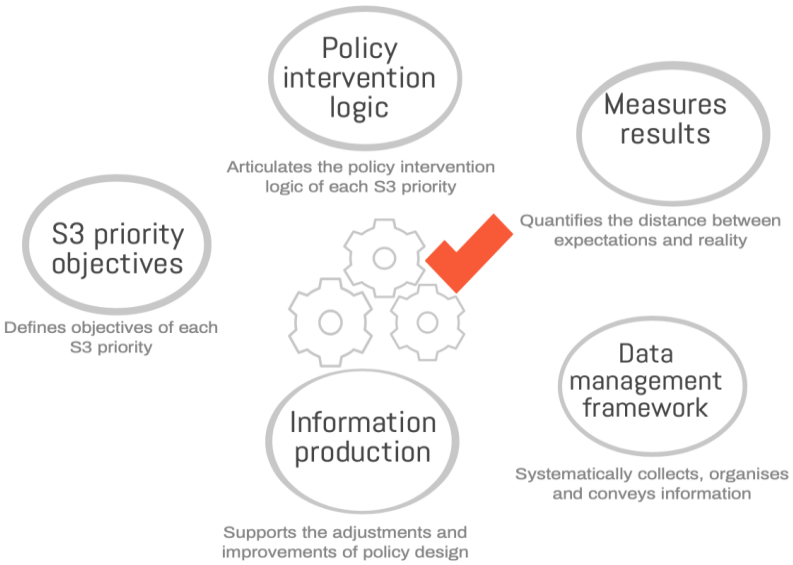
4.1. Criteria of an effective S3 monitoring and evaluation system

Based on the literature review presented in sections 3.1 and 3.2, the criteria of an effective S3 monitoring and evaluation system has been defined. To be able to measure its effectiveness, the following main conditions need to be assessed:

- The S3 M&E system defines the objectives of each S3 priority area including articulation of policy intervention logic of each Smart Specialisation priority.
- The S3 M&E system quantifies the distance between expectations and reality of the intervention, including gathering evidence about the socio-economic impact of Smart Specialisation.
- The S3 M&E system systematically collects, organises, and conveys information about the developments of policy interventions. S3 monitoring and evaluation system is equipped with a data management framework that includes decisions on data management, data quality and assurance, skills and capacity requirements, processes of data management and data use. This is about how the S3 M&E system uses data to inform evidence-based policy making and how to communicate information to multiple stakeholders.
- The S3 M&E system produces information supporting adjustment and improvement of policy design, thereby contributing to a cyclical learning process that allows the understanding of the relationship between actual and expected results. There is a mechanism in place that aims to verify the soundness of the logic of policy intervention and that aims to identify and support future improvements in the policy design and delivery mechanisms.

Figure 2 shows the interdependence of the criteria of an effective S3 monitoring and evaluation system as defined above.

Figure 2 Criteria of an effective S3 monitoring and evaluation system



Source: authors' elaboration

4.2. The research questions

To be able to assess the effectiveness of the S3 M&E systems, the following research questions are to assess in order to discover the extent to which the S3 M&E system allow and contribute to a cyclical policy learning process for improved policy design and mechanisms:

1. Is the S3 M&E system able to measure the socio-economic-environmental impact of the S3 related interventions?
2. Has the S3 M&E system allowed to understand the relationship between the actual and expected results of S3 related investment?
3. Does the S3 M&E system collect, organises and conveys information about the development of the policy interventions in a way that provides, manages and uses data that contributes to evidence-driven policy?
4. Has the S3 M&E system identified timely feedback mechanisms both during the programme implementation and at its conclusion?
5. Is there a mechanism in place that aims to verify the soundness of the policy intervention logic and to identify and support future improvements in the policy design?
6. Is the methodological approach adopted suited for an overall evaluation of the whole S3 strategy?
7. Does the M&E system allow the involvement of all the relevant stakeholders?

4.3. Methodology of empirical research

Various sources of primary information have been used to perform this analysis: a survey addressed to S3 implementing authorities, analysis of implementation measures and case study reports.

A survey has been launched by the Territorial Development Unit of the Joint Research Centre (JRC) to collect primary information from national and regional authorities responsible for Research and Innovation Strategies for Smart Specialisations across the EU. This survey aimed at gathering respondents' general reflections on their RIS3 experience and their observations on the future of the Smart Specialisation policy agenda. The survey consisted of four section: governance, Entrepreneurial Discovery Process (EDP), implementation measures, and monitoring and evaluation.

Through the analysis of the S3 implementation measures, the research intended to measure the extent to which implemented S3 policy measures reflect in practice the expected design principles of S3. A range of administrative and financial data has been collected of the implemented measures targeting strengthening research, technological development and innovation ("Thematic Objective 1") of the European Regional Development Fund. Thus, call for proposals have been analysed that are financed or co-financed along S3 priority areas. The analysis of implementation measures has been completed in 22 regions and Member States.

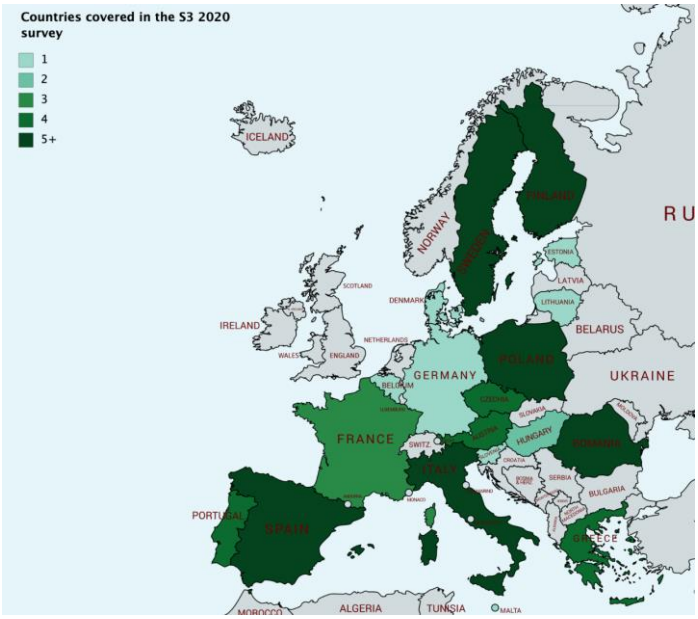
In parallel, case study research has been prepared in the same regions and Member States, which gathered evidence on various components of the S3 policy concept through secondary data and semi-structured interviews with public officials involved in the design, implementation, monitoring and evaluation of the strategies and relevant stakeholders.

The survey has been filled out by 79 respondents from nineteen countries, of which six are Central and Eastern European Countries (Figure 3). The 89 percent of the respondents represent a regional administration (25 less developed regions; 39 more developed regions; 7 transition regions), while the 11 percent a national administration (including the Six-city strategy of Finland). The case studies cover

thirteen regions (2 less developed regions; 3 transition regions; 8 more developed regions) and 4 countries (Poland, Hungary, Slovenia and Spain).[14]

The survey and the case studies provide a wide geographical coverage and include territories at different level of development and with different institutional settings. The results of our analysis can, therefore, be considered representative of general trends regarding monitoring and evaluation practices across Europe.

Figure 3 Countries covered by the S3 survey 2020



Source: Hegyi et al, 2021

The following sections provide an overview of the results of these analytical exercises executed in 2020 that intended to provide an assessment of the policy experience with some reflections for the 2021-2027 EU Cohesion policy.

[14] The regions are from the following countries: Finland (3), Germany (1), Italy (5), Poland (1) and Spain (3).

5. S3 Monitoring and Evaluation Systems: survey and case studies results

5.1. General objectives and main results of the S3 strategy

As well known, a prerequisite of any monitoring and evaluation system is the identification of clear objectives (Gianelle and Kleibrink, 2015; Kleibrink et al., 2016). This is even more important for a Smart Specialisation strategy, given the complex nature of this innovation policy (Asheim et al., 2017; Prota, 2019). Subsequently, it is necessary to have a monitoring system that allows to collect, organise, and conveys information about the developments of policy interventions and to measure the distance between the actual and expected results of S3 related investment.

These issues were addressed in the survey. Over 75 percent of respondents have answered that their S3 strategy has set explicit objectives for S3 priorities, out of which, 38 percent have unique objectives defined for each S3 priority; however, a not negligible percentage declares that the strategy has no explicit objectives set for S3 priorities, as shown in Figure 4.

Figure 4 Existence and quality of overall S3 objectives

Source: Hegyi et al, 2021

Besides measuring the direct results of S3 instruments and projects, the M&E systems need to understand the impact of the strategy (Grillitsch and Asheim, 2018). Looking at how many regions/countries measure the socio-economic-environmental impact of the S3 related interventions, about 64 percent of respondents have indicated that they measure such impact. Out of this 64 percent, 38 percent think that measuring such impact provides useful insights into evaluation and planning, while 26 percent believe that the results of such measures are not satisfactory. Interestingly, among the respondents which do not measure the impact of the S3 related interventions, we find nine less developed regions and fourteen more developed regions. At national level we find four out of eight countries (Table 1).[15]

[15] The quality of indicators and the need for customization of existing indicators to S3 objectives were mentioned by respondents among factors for not satisfactory results of measuring impact of S3.

Table 1 Do you measure the socio-economic-environmental impact of the S3 related interventions?

	Yes, and it gives us useful insights into evaluation and planning		Yes, but the results we get are not satisfactory		No, we do not measure them		Total	
Less developed regions	9	(36.0%)	7	(28.0%)	9	(36.0%)	25	(100.0%)
More developed regions	14	(35.9%)	11	(28.2%)	14	(35.9%)	39	(100.0%)
Transition regions	5	(71.4%)	1	(14.3%)	1	(14.3%)	7	(100.0%)
Countries	2	(25.0%)	2	(25.0%)	4	(50.0%)	8	(100.0%)
Total	30	(38.0%)	21	(26.6%)	28	(35.4%)	79	(100.0%)

Source: authors' elaboration based on survey data

5.2. Distinctive features of the S3 strategy monitoring system

By crossing the answers related to the presence of explicit objectives for the S3 priorities with the answers related to the presence of result indictors for the S3 priorities, we get the matrix shown in Table 2. As expected, there is a correlation between objectives and indicators: if the former are unique for each priority, so are the latter (top left quadrant in the table below). In this group we find seventeen regions and two countries. Alike numerous regions and countries which have objectives common to several priorities also have indicators common to several priorities (central quadrant of the table). Numbers in the table indicate ratio of total (79) responses.

Table 2 Links between S3 strategy objectives and result indicators

Does your strategy have results indicators set for S3 priorities?	Does your strategy have explicit objectives set for the S3 priorities?		Yes, they are unique for each priority		Yes, but they are common to several priorities		No		Total	
Yes and they are unique for each priority		Less developed regions	8	(80,0%)	1	(10,0%)	1	(10,0%)	10	(100,0%)
		More developed regions	6	(60,0%)	2	(20,0%)	2	(20,0%)	10	(100,0%)
		Transition regions	2	(50,0%)	1	(25,0%)	1	(25,0%)	4	(100,0%)
		Countries	2	(100,0%)	-	(0,0%)	-	(0,0%)	2	(100,0%)
		Total	18	(69,2%)	4	(15,4%)	4	(15,4%)	26	(100,0%)
Yes, but they are common to all priorities		Less developed regions	0	(0,0%)	6	(60,0%)	4	(40,0%)	10	(100,0%)
		More developed regions	5	(26,3%)	9	(47,4%)	5	(26,3%)	19	(100,0%)
		Transition regions	2	(66,7%)	1	(33,3%)	-	(0,0%)	3	(100,0%)
		Countries	0	(0,0%)	3	(100,0%)	-	(0,0%)	3	(100,0%)
		Total	7	(20,0%)	19	(54,3%)	9	(25,7%)	35	(100,0%)
No		Less developed regions	0	(0,0%)	2	(40,0%)	3	(60,0%)	5	(100,0%)
		More developed regions	4	(44,4%)	4	(44,4%)	1	(11,1%)	9	(100,0%)

Transition regions	0	(0.0%)	-	(0.0%)	-	(0.0%)	-	(0.0%)
Countries	0	(0,0%)	-	(0,0%)	4	(100,0%)	4	(100,0%)
Total	4	(22,2%)	6	(33,3%)	8	(44,4%)	18	(100,0%)

Source: authors' elaboration based on survey data

Overall, the judgment on the usefulness of indicators is positive: about 42 percent of respondents have indicated that result indicators are very useful, 48 percent that they are useful, while around 10 percent find them not so useful or not at all useful (Table 3).

Table 3 If you have a system of result indicators, how do you assess its usefulness?

	Extremely/very useful		Somewhat useful		Not so useful		Not at all useful		Total	
Less developed regions	10	(50.0%)	9	(45.0%)	0	(0.0%)	1	(5.0%)	20	(100.0%)
More developed regions	11	(36.7%)	16	(53.3%)	3	(10.0%)	0	(0.0%)	30	(100.0%)
Transition regions	3	(42,9%)	4	(57.1%)	0	(0.0%)	0	(0.0%)	7	(100.0%)
Countries	2	(40.0%)	1	(20.0%)	2	(40.0%)	0	(0.0%)	5	(100.0%)
Total	26	(41.9%)	30	(48.4%)	5	(8.1%)	1	(1.6%)	62	(100.0%)

Source: authors' elaboration based on survey data

The analysis of the case studies provides us with detailed information on the use and type of indicators eventually chosen. In most cases there is a use of indicators for monitoring, but they are not always specific for the S3: slightly less than 50 percent has specific indicators (sometimes they are the same indicators used for ERDF Operational Programme).[16] The monitoring system adopted is generally divided into three levels: "context indicators", "output indicators", "result indicators".

The main challenges related to the monitoring system that emerge concern the lack of adequate and timely data to elaborate sound indicators in order to go beyond a mere accountability-based approach and the absence of clear connections between objectives and indicators.

Examples of well-defined monitoring systems are those of Emilia-Romagna (an Italian region classified as "moderate + innovator" according to the Regional Innovation Scoreboard 2019) and Catalonia (a Spanish region classified as "moderate + innovator" according to the Regional Innovation Scoreboard 2019). In particular, with reference to Emilia-Romagna experience, it should be emphasized the use of "specialisation indicators" and "transition indicators" in order to understand whether expected structural changes are being realized and they are coherent with the S3 objectives.[17] The Catalonia experience is noteworthy for its attempt to monitor the entrepreneurial discovery process through the evolution of leading RIS3CAT sectoral areas and identification of emerging activities using technological and market

[16] This is the case, for example, of North Rhine-Westphalia (a German region classified as "strong innovator" according to the Regional Innovation Scoreboard 2019). "Apart from the usual ERDF monitoring there is no dedicated RIS3 monitoring. [...] There is no complete overview of where RIS3 implementation stands now or how it has evolved since 2014. ERDF monitoring is the only tool to measure progress since it does cover large parts of RIS3" (Case Study: North Rhine-Westphalia).

[17] "The Emilia Romagna Region has a specific S3 monitoring system aiming at providing data for measuring constantly the implementation of the Strategy and the reached results, also supporting updating and revision of the S3 and eventual corrective actions" (Case Study: Emilia Romagna).

surveillance and a constant dialogue with the companies and stakeholders in the research and innovation system.

5.3. From monitoring to evaluation

Data collection is done systematically by 80 percent of respondents to the survey. This 80 percent stand for 64 total responses out of the 79 representing 35 more developed regions (43 percent of total), 17 less developed regions (21.5 percent of total), 4 transition regions (5 percent of total), 8 countries (10.1 percent of total). According to the survey results, most implementing authorities collect data via reports / evidence on the progress and results of funded projects (52 out of 63), official socio-economic statistics (46 out of 63), stakeholder consultation (40 out of 63) and surveys / interviews with beneficiaries (38 out of 63).

By crossing the answers related to data collection on strategy implementation with the answers related to past or future S3 evaluation exercises, we get the matrix shown in Table 4. The availability of reliable and timely data on the implementation of a smart strategy is a fundamental prerequisite for the evaluation of this strategy. This consideration is confirmed by our survey: the regions and countries which collect information on the strategy implementation in a systematic way are the same that have carried out or planned evaluation exercises of the S3.

Table 4 Links between systematic data collection and S3 specific evaluation exercises

			Have you carried out and/or are you planning any S3 specific evaluation exercises?					
			Yes		No		Total	
Do you collect information on the strategy implementation in a systematic way?	Yes	Less developed regions	17	(100,0%)	0	(0,0%)	17	(100,0%)
		More developed regions	29	(82,9%)	6	(17,1%)	35	(100,0%)
		Transition regions	4	(100,0%)	0	(0,0%)	4	(100,0%)
		Countries	6	(75,0%)	2	(25,0%)	8	(100,0%)
	No	Less developed regions	7	(87,5%)	1	(12,5%)	8	(100,0%)
		More developed regions	5	(100,0%)	0	(0,0%)	5	(100,0%)
		Transition regions	3	(100,0%)	0	(0,0%)	3	(100,0%)
		Countries	0	(0,0%)	0	(0,0%)	0	(0,0%)

Source: authors' elaboration based on survey data

The percentage of respondent who declare to have carried out or planned evaluation exercises of the S3 is very high for all categories of regions as well as for countries. Therefore, there seems to be awareness of the importance of evaluation. This is particularly important since, in a complex world, where there is uncertainty about public policies impacts and even about the channels of impact, evaluation has an important role as policy instrument which helps deal with uncertainty and complexity.

Considered the vision behind the S3, the monitoring and evaluation system should take into account the impact of the overall strategy on the regional/national territory. About 64 percent of respondents to the survey states to have carried out or planned an impact evaluation for the overall S3 strategy (this percentage is the highest for the group of more developed regions) (Table 5).

Table 5 Have you carried out and/or are you planning an impact evaluation for the overall S3 strategy?

	Yes		No		Total	
Less developed regions	16	(66.7%)	8	(33.3%)	24	(100.0%)
More developed regions	24	(70.6%)	10	(29.4%)	34	(100.0%)
Transition regions	3	(42.9%)	4	(57.1%)	7	(100.0%)
Countries	2	(33.3%)	4	(66.7%)	6	(100.0%)
Total	45	(63.4%)	26	(36.6%)	71	(100.0%)

Source: authors' elaboration based on survey data

Looking at the case studies, eight regions and one country plan to carry out the evaluation of the overall S3 strategy, six of these eight regions and the country plan to carry out evaluation of specific measures as well. Three regions and one country, instead, plan to carry out only the evaluation of specific measures.

The existence of a link between monitoring and evaluation is confirmed by the case studies: almost all the regions/countries in our sample with a monitoring system have an evaluation system, too.[18] It is difficult to know whether the advent of the S3 policy has changed existing evaluation practices. The evidence gathered seems to suggest that there has been no discontinuity in terms of approach, methodologies and so on with respect to previous evaluation exercises. It is the case of Tuscany (an Italian region classified as "moderate + innovator" according to the Regional Innovation Scoreboard 2019), for example, where the "evaluation activities of S3 are [...] part of a consolidated experience in the field leveraging on the presence of competences, modelling tools and analytical infrastructures provided by IRPET" (Case study: Tuscany).

Another important aspect examined in the case studies is the extent to which the monitoring and evaluation system allows for the involvement of all relevant stakeholders. The evidence is mixed. In half of the cases stakeholders are actively engaged.

5.4. The contribution of S3 evaluation to the learning process

Evaluation can play a role in policy development to the extent that produce continuous learning why certain actions produce effects, for whom, and under which conditions, intentionally or un-intentionally. This would allow policymakers to react to new information and emerging results. In this perspective the lessons learned should be integrated in the next programming period.

Based on the results of our survey, it seems that this process of policy learning is underway; in particular, in the case of more developed and transition regions and at national level. Less pronounced, instead, for less developed regions (Table 6).

[18] "The results from monitoring have been used mostly during the evaluation and development of the strategy documents" (Case study: Helsinki-Uusimaa). On the contrary, "the choice not to create a dedicated monitoring system does not always allow to have valuable information with respect to the provisions of the Strategy and to support evaluations more consistent with the purpose of the Strategy" (Case Study: Lombardia).

Table 6 To what degree do you integrate the results of current S3 monitoring and evaluation mechanisms into the planning of the next programming period?

	No integration of results	To a small extent	To some extent	To moderate extent	To a large extent	Total
Less developed regions	1 (4,0%)	1 (4,0%)	8 (32,0%)	7 (28,0%)	8 (32,0%)	25 (100,0%)
More developed regions	1 (2,6%)	2 (5,1%)	3 (7,7%)	13 (33,3%)	20 (51,3%)	39 (100,0%)
Transition regions	0 (0.0%)	0 (0.0%)	0 (0.0%)	3 (42,9%)	4 (57,1%)	7 (100,0%)
Countries	0 (0.0%)	0 (0.0%)	0 (0.0%)	5 (62,5%)	3 (37,5%)	8 (100,0%)
Total	2 (2,5%)	3 (3,8%)	11 (13,9%)	28 (35,4%)	35 (44,3%)	79 (100,0%)

Source: authors' elaboration based on survey data

The existence of a process of policy learning mainly in more developed regions is confirmed by our case studies: it is clearly referred to in 4 regions (it is also referred to in a Polish transition region).

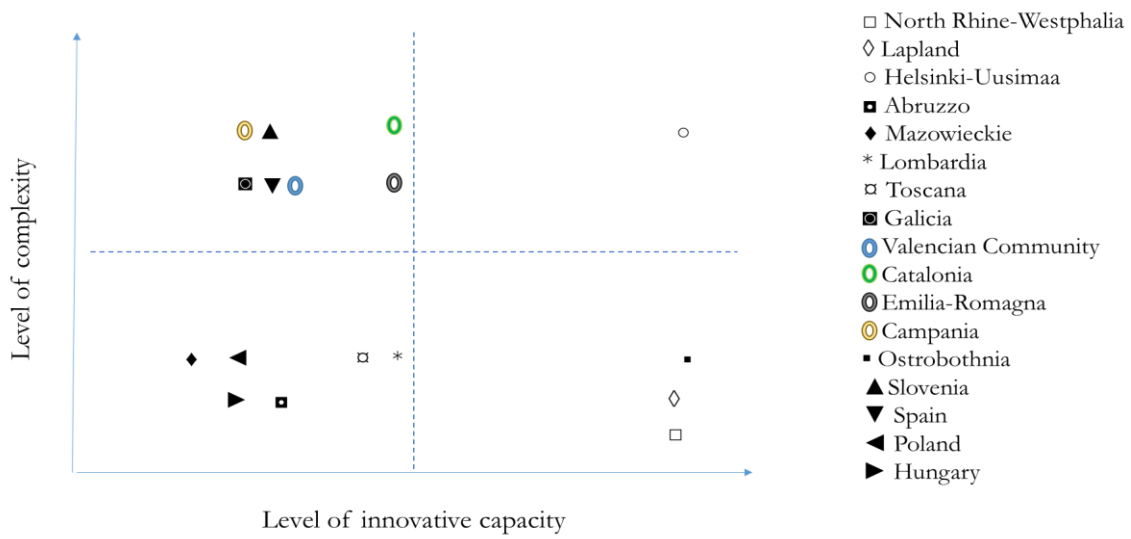
No matter how good the quality of the evaluation, its value will only be realised if there are effective channels for communication and influencing to increase the likelihood that the results are used. With reference to this aspect, slightly more than half of the regions and countries in our sample of case studies have put in place a system to ensure that monitoring and evaluation results reach policymakers.[19] It is evident that there is still work to be done on this front.

Finally, it is interesting to try to classify regions and countries in our sample of case studies on the basis of two indicators: innovation performance, as measured by the regional innovation scoreboard and European innovation scoreboard, and level of complexity of the monitoring and evaluation system.[20] Figure 5 shows us a heterogeneous situation reflecting innovative capacity and complexity of the monitoring and evaluation systems.

Figure 5 Innovative capacity and complexity of the monitoring and evaluation system

[19] Among the positive examples there is the Finnish region of Ostrobothnia (classified as "innovation leader -" according to the Regional Innovation Scoreboard 2019). "Previously there has not been very formal channels through which policymakers were approached. This has now changed as the board of the regional council and regional co-operation group are formally in charge of S3 strategy. This new structure is especially going to act as new channel, which will ensure that policymakers are more heavily involved than they previously have been. This applies especially for monitoring and reporting but will also be a natural way to ensure that evaluations reach policymakers" (Case study: Ostrobothnia).

[20] This indicator is built on the basis of the information contained in the case studies. In particular, it considers the presence of the following four elements: a specific monitoring system, a specific evaluation system, link between monitoring and evaluation, channels to ensure the flow of information.



Source: authors' elaboration based on survey data

It should be noted that there is only one region in the upper right quadrant. This means that the adoption of a complex monitoring and evaluation system does not necessarily correspond to a high level of innovation performance. On the contrary, we find several regions and countries with both low innovative capacity and low level of complexity.

6. Conclusions

In this report we present a survey of the literature on smart strategies monitoring and evaluation and an assessment of the state of play of Smart Specialisation strategies monitoring and evaluation practices across Europe.

The huge evidence gathered through the survey and case studies and the main insights from the literature review allow us to draw some policy implications, hopefully useful for the next programming period. Still, it is important to highlight that given the lack of long run evidence from the programming period 2014-2020, the update of S3 strategies present limitations. For clarity we summarize our ideas into separate bullet points.

- As highlighted in the literature (Foray et al., 2011; Foray, 2015), the adoption of the Smart Specialisation concept as a guiding principle to implement innovation strategies represented a culture change for most regions, whether developed and already well acquainted with regional innovation policy practices or less developed with lower innovation performance. The practice of policy monitoring and evaluation continues to lag behind. It is time for a new culture change, "in which policymakers demand evaluation studies not because they have to comply with some administrative requirements, but because they are genuinely interested in, and committed to, learning" (Gianelle et al., 2019).
- In defining indicators for the monitoring system, it is essential that they are adequately linked to the priorities chosen for the Smart Specialisation strategy; what the regions (countries) need is an explicit theory of change. Indeed, based on the results of our empirical analysis, in several cases the indicators for monitoring are not specific for the S3.
- It is necessary to identify a dedicated team responsible for S3 monitoring and evaluation within the public administration (equipped with adequate human and financial resources), in order to have an evaluation of the S3 results and the effectiveness of the policy intervention logic. The Spain case study documents the existence of a dedicated team responsible for the monitoring and evaluation of the national strategy, next to the decision-making level, and emphasizes its relevance.
- To support evaluation activities, it is important to collect accurate and timely data relating to the behaviour of innovation actors, even those not represented in regional calls. This issue is explicitly addressed in the Tuscany case study report, for example. Indeed, if you are looking for a more data-driven and nuanced approach to policymaking, then you should consider what actually drives the decisions and behaviours of citizens rather than relying on assumptions of how they should act (Kuehnhanss, 2019).
- The need for timely available data is acknowledge in almost all case studies. In view of in the next programming period, to meet this need, it would be necessary to make use of analytical and informative tools (big data, web semantics, etc.) able to provide different kind of data and faster return.
- Traditional evaluation approaches based on accountability need to be complemented by more sophisticated approaches in which monitoring and evaluation are not seen just as an integrated part of the policy making cycle, but as an instrument itself aiming at enhancing the learning capacity of the system and, therefore, reconciling the implications of increasing social complexity with the requirement for effective public policy intervention. An implication for the timing of evaluations is evident: evaluation should occur concurrently alongside programme development and implementation.
- As highlighted in the literature (Walton, 2014; Prota, 2019), complexity theory may provide a useful conceptual framework for evaluation in innovation: a complexity framework adds to evaluation the understanding of how, why and to what extent policies need to adapt to the environment and stakeholders' perceptions and, therefore, can help in the evaluation of S3 policy impact.

- The use of evaluation in the policy cycle could be improved if good processes are put in place for feedback from evaluators to policymakers, both during the programme and at its conclusion. The importance of getting policymakers involved is explicitly recognized in the Ostrobothnia and Valencian Community case study reports, for example.

4. Annex 1

Conceptual and methodological guidelines for conducting case study research on Smart Specialisation monitoring and evaluation systems

This section presents the methodological guidelines prepared by the authors that guided the case study research performed in our research project.

Background

Solid Smart Specialisation monitoring and evaluation (M&E) framework is a necessary tool that can help policymakers and practitioners ensure the effectiveness of S3 implementation. While monitoring system allows to continuously assess progress, evaluation is an occasional / periodical activity that allows policymakers to assess if the strategy has reached (is reaching) its expected results and objectives building on the data provided by the monitoring system. The S3 M&E system allows adjusting certain policy measures and instruments while continuing the implementation of S3, thus the monitoring and evaluation framework allows policymakers to monitor the progress and to evaluate the outcomes and impact of ongoing policy actions, resulting in a cyclical policy learning process.

While supporting the re-examination or validation of earlier policy decision and the advancement as regards to strategic objectives, the M&E framework enables policy makers to bring better informed decisions when determining the impact and effectiveness of a policy program (OECD 2009). Hence, in line with the European Commission's Smart Specialisation Implementation guide, monitoring and evaluating the implementation of innovation policies contribute to minimising duplication and fragmentation of efforts, while providing policy evaluators a basis for comparison and benchmarking of policies and policy makers a basis for preparing for the next programming period (Gianelle et al., 2016).

Setting the scene

A sound S3 monitoring system 'acts as early warning mechanism signalling critical aspects of policy implementation' that provide an input for S3 evaluation. S3 evaluation is only possible if there exist a clear interventions logic that links 'ends with means' (Gianelle et al., 2019). This requires an M&E in place that collects, manages accurate, complete and relevant data that drives data- and evidence-driven decision making.

Given the timing of the analysis, a process evaluation of M&E systems of S3 will be performed; the objective of which is to assess whether the principles of Smart Specialisation (S3) as regards to monitoring and evaluation hold true in practice from the experiences gained during the 2014-2020 programming period. Thus, the analysis aims to evaluate the efficiency and effectiveness of S3 monitoring and evaluation systems of national and regional authorities implementing S3.

Based on literature review, the paper will define the criteria of an effective S3 monitoring system. The fulfilment of these criteria is analysed through interviews with national, regional authorities responsible for the implementation of Smart Specialisation and through analysis of calls for funding under Thematic Objective 1 (TO1) of national and regional Operational Programmes for the European Regional Development Fund (ERDF).

To be able to measure the effectiveness of the S3 monitoring and evaluation system, the following main conditions need to be assessed:

- The S3 M&E system defines the objectives of each S3 priority area including articulation of policy intervention logic of each Smart Specialisation priority.
- The S3 monitoring system quantifies the distance between expectations and reality of the intervention, including gathering evidence about the socio-economic impact of Smart Specialisation.
- The S3 M&E system systematically collects, organises and conveys information about the developments of policy interventions. S3 monitoring and evaluation system is equipped with a data

management framework that includes decisions on data management, data quality and assurance, skills and capacity requirements, processes of data management and data use. This is about how the S3 M&E system uses data to inform evidence-based policy making and how to communicate information to multiple stakeholders.

- The S3 monitoring system produces information supporting adjustment and improvement of policy design, thereby contributing to a cyclical learning process that allows the understanding of the relationship between actual and expected results. There is a mechanism in place that aims to verify the soundness of the logic of policy intervention and that aims to identify and support future improvements in the policy design and delivery mechanisms.

Research questions

By exploring these four conditions and the changes introduced by the S3 experience, the field research should aim to answer the following research questions:

? To what extent does the S3 M&E system allow and contribute to a cyclical policy learning process for improved policy design and mechanisms?

? Is the S3 M&E system able to measure the socio-economic-environmental impact of the S3 related interventions?

? Has the S3 M&E system allowed to understand the relationship between the actual and expected results of S3 related investment?

? Does the S3 M&E system collects, organises and conveys information about the development of the policy interventions in a way that provides, manages and uses data that contributes to evidence-driven policy?

? Has the S3 M&E system identified timely feedback mechanisms both during the programme implementation and at its conclusion?

? Is there a mechanism in place that aims to verify the soundness of the policy intervention logic that aims to identify and support future improvements in the policy design?

? Is the methodological approach adopted suited for an overall evaluation of the whole S3 strategy?

? Does the M&E system allow the involvement of all the relevant stakeholders?

5. Annex 2

Methodology for conduction the case studies

The questions are articulated around the following four dimensions:

- General objectives and main results of the S3 strategy;
- Specificity and usefulness of the S3 monitoring system;
- S3 monitoring system usage;
- S3 evaluation.

General objectives and main results of the S3 strategy

What is (are) the overall objective(s) of your S3 strategy and how do you measure if the strategy is successful? (Source of information: documents and then interview with administration staff, interviews with stakeholders).

First, please check in the strategy documents whether there are clear objectives defined for the S3 strategy. Note that they should be precisely identified, i.e. a "vision" for the strategy would not be enough. Note also that strategy's objectives do not need to be the same than the objectives of the ERDF Operational Programme.

Second, please ask during the interview [to both policy makers and stakeholders] what is(are) the main objective(s) of the strategy and how they measure its(their) achievement. This question is also aimed to understand whether the policy makers are fully aware of the objective(s) of the strategy, which is something that may be forgotten due to turnover in the administration and/or simply due to the routines of implementation. It is important here also to collect evidence on whether government and relevant stakeholders identifies similar or different objectives for the strategy and if there is agreement (or not) on how success is defined and how it should be measured.

What are the most important results you achieved with S3? (Source of information: interview with administration staff, interviews with stakeholders).

Are they aligned with expectations? (Source of information: interview with administration staff, interviews with stakeholders).

Please ask what the results/effects of the strategy are emerging so far. Please note that those results/effects may not necessarily be captured yet by monitoring/evaluation activities: the policy maker may have different information sources allowing to grasp those tendencies. Also note that the emerging results/effects may refer to organisational and institutional changes or behavioural changes.

Please also ask how they measure /quantify the socio-economic-environmental impact of the S3-related interventions and if they have been able to formally capture such impact so far.

Ask whether the emerging results/effects are aligned with the expected goals and trends or they underperform. In the latter case, please ask to provide a possible explanation (e.g. nature of the obstacles, or administrative or political issues etc.).

Are there also effects which were not at all expected?

In addition, ask for whom the strategy has / has not produced effects.

Specificity and usefulness of the S3 monitoring system

What are the distinctive features of the S3 strategy monitoring system? (Source of information: documents and then interview with administration staff).

How useful is it to have a dedicated monitoring system for the S3 strategy besides the OP one? (Source of information: interview with administration staff).

The monitoring activities carried out at the OP level need to follow a predefined scheme set out in the ERDF regulations and typically operate at a higher aggregate level than S3 priorities. Therefore, they may be not suitable to closely follow the developments of the S3 logic of intervention.

For the first question, please look first at the strategy documents and monitoring reports to discover whether a distinctive monitoring system was developed in alignment with the specific objectives and structure of the S3 strategy. Check whether there are specific objectives and result indicators set for each priority and whether they are unique and different for each priority or common to several priorities. Second, please double check and comment that information with the policy maker during the interview, and ask their view on the usefulness of the indicators used.

The second question aims to understand three related aspects: (i) whether the policy maker really believes it is useful to have such dedicated system, (ii) the reasons why it is useful, and (iii) the elements / activities / characteristics that are most crucial.

In the end, you should be able to provide a comprehensive assessment on the clarity and soundness of the policy intervention logic that can be derived by looking at the monitoring system.

Which actors are involved in the monitoring and evaluation of S3 and what are their responsibilities? (Source of information: interview with administration staff, interviews with stakeholders).

The question intends to discover whether there is a dedicated team responsible for S3 monitoring and evaluation within the public administration (please ask separately for monitoring and for evaluation, since the reply may vary), and whether that team possesses the necessary competences. It should also aim at verifying where the team is formally positioned within the public administration: is it 'next' to the decision-making level? It is a "proxy" of the importance attached to monitoring activities.

Moreover, the question aims to verify the existence of a structured, cyclical data management (gathering, analysing and conveying data) that supports the adjustment and improvement of policy design, and to understand how stakeholders are involved in those activities. Given the relevance of inclusivity and participatory approach that help building relationships and increase learning capacities, please ask if there was an ex-ante selection of stakeholders to be involved ensuring representativeness for both monitoring and evaluation.

S3 monitoring system usage

How are monitoring findings used to improve policy implementation? What are the mechanisms to re-act to the monitoring evidence? (Source of information: interview with administration staff).

Can you provide some examples? (Source of information: interview with administration staff).

The S3 monitoring system acts as early warning mechanism signalling critical aspects of policy implementation which calls for corrective action.

The first question intends to discover how the public authority handles the monitoring information in practice and whether there are systematic procedures or at least accumulated experience on how to incorporate monitoring information into decision making processes.

More in general, the question intends to discover whether or not the monitoring information is really used to design better policy measures (learning). In case it is evident that this is not the case, please ask why and which are the main obstacles.

With the second question, we look for concrete examples on how monitoring information was used to redesign policy instruments, how it was used to redefine some aspects of the strategy (priorities, objectives, etc.), how implementation problems detected through monitoring activities were further explored through evaluation studies, etc.

S3 evaluation

How is the past experience with policy evaluation in the region/country? (Source of information: interview with administration staff).

Has S3 had an impact on existing evaluation practices? (Source of information: interview with administration staff).

The first question intends to discover whether there is a tradition of policy evaluation in the region/country. This includes understanding whether the public administration has the internal competences to organise/carry out evaluations, or it just resorts to external providers; and whether past evaluations have informed the policy making process.

The second question aims to understand (i) whether the interviewees think it is necessary to adopt new evaluation methods to take into account the specific features of S3 strategies and the related challenges, and (ii) whether and how the advent of the S3 policy has actually changed existing evaluation practices and which are the new elements that were introduced.

What evaluation questions have you addressed or planned to address in your S3 evaluation exercises? (Source of information: documents and interview with administration staff).

This question aims to provide concrete examples of the type of evaluation questions policy makers are thinking of. Particularly interesting would be to understand whether: (i) evaluations are carried out for the whole strategy, or for individual priority areas, for single instruments, or for single measures, or a mix of those; (ii) the objectives of the evaluation exercises correspond to the strategy objectives or go beyond them, or are just not directly related to them; (iii) evaluations take into account the relevance of a continuous learning why certain actions produce effects, for whom, and under which conditions, intentionally or un-intentionally.

It would be interesting to know whether and how the environmental and sustainability dimension or grand societal challenges are being addressed.

If evaluations have already been carried out, it would be interesting if and to what extent the results have informed the decision-making process.

Which channels did you put in place in order to ensure the flow of information from evaluators to policy makers? (Source of information: interview with administration staff).

The use of evaluation in the policy cycle could be improved if good processes are put in place for feedback from evaluators to policy makers. No matter how good the quality of the underlying evaluation, its value will only be realised if there are effective channels for communication and influencing to increase the likelihood that the results are used.

6. Annex 3

The survey on Smart Specialisation monitoring and evaluation systems

As a part of the research project, the Territorial Development Unit has decided to launch a survey to collect primary information from national and regional authorities responsible for Research and Innovation Strategies for Smart Specialisations. The survey aimed at gathering respondents' general reflections on their S3 experience.

The survey consisted of four sections, and this annex provides an overview of the questions related to monitoring and evaluation.

Do you measure the socio-economic-environmental impact of the S3 related interventions?

- ○ No, we don't measure them
- ○ Yes and it gives us useful insights into evaluation and planning
- ○ Yes, but the results we get are not satisfactory*

Does your strategy have explicit objectives set for the S3 priorities?

- ○ No
- ○ Yes, they are different and unique for each priority
- ○ Yes, but they are common to several priorities

Does your strategy have result indicators set for the S3 priorities?

- ○ No
- ○ Yes, but they are different and unique for each priority
- ○ Yes, they are common to several priorities

If you have a system of result indicators, how do you assess its usefulness?

***Have you done revision(s) of the system of indicators?**

Do you collect information on the strategy implementation in a systematic way?

- ○ Yes
- ○ No

How do you collect information on the strategy implementation? (Select all that apply)

- [ ] Official socio-economic statistics
- [ ] Ad-hoc quantitative studies
- [ ] Surveys of target populations
- [ ] Surveys/interviews of beneficiaries
- [ ] Stakeholder consultations
- [ ] Reports/evidence on the progress and results of funded projects
- [ ] Open-data sources
- [ ] Other

Are there planned and systemic outputs of monitoring activities? (such as internal reports, period publicly available reports, online dashboards, workshops, etc.)

- ( ) Yes
- ( ) No

What are the outputs of the monitoring activities? (Select all that apply)

- [ ] Internal reports
- [ ] Periodic reports publicly available
- [ ] Online dashboards
- [ ] Workshops and seminars with stakeholders
- [ ] Design of evaluation studies to explore implementation problems, etc.
- [ ] Other

Have you carried out and/or are you planning any S3 specific evaluation exercises?

If yes, please indicate the type of evaluations:

- [ ] Impact evaluation for the overall strategy
- [ ] Impact evaluation for priority areas
- [ ] Impact evaluation for specific instruments
- [ ] Implementation evaluation

☐ Other

If yes, please indicate the number

Are you performing /will you perform evaluations explicitly addressing one or more of the following dimensions besides the general objectives of the strategy? (Select all that apply)

☐ Environment/sustainability

☐ Specific sub-regional territories

☐ Metropolitan/rural areas

☐ Specific societal challenges affecting your region / country

☐ Not applicable

To what degree do you integrate the results of current S3 monitoring and evaluation mechanisms into the planning of the next programming period? (Please select from the scale, where 5 means to a large extent and 1 is not at all)

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KJ-NA-30654-EN-N

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doi:10.2760/443642

ISBN 978-92-76-32592-5