Master Thesis in Innovation and Entrepreneurial Technology

Smart Specialization (SS):

Understanding the approach to RIS3 and a bibliometric account of SS roots and scientific literature

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Acknowledgments

This effort is fully dedicated to my family, my beloved sun my life, to my husband the other half of me , to my wonderful mum and encourager dad, you will always be my pillars.

My sincere appreciation to my supervisor Aurora Teixeira, this dream would not be possible without you. I will carry you in my heart.

Abstract

The literature on Smart Specialization (SS) is considered to be a very recent field of research within the innovation and regional studies areas. Although the label is new, some might considered that the concept of SS can be traced back to most well-known notions of 'National Systems of Innovation', 'Regional Systems of innovation', the 'Innovative Milieu', the 'regional clusters', or the 'Triple helix model'.

The present dissertation is composed by to separate but interconnected parts.

The first part frames the evolutionary context of SS approach and related concepts, considering its importance in the social and economic development of a region. We briefly describe the RIS 3 guide (Guide to Research and innovation Strategies for smart specialization) suggestion for the implementation process of a SS Strategy, and conduct a broad and comparative content analyze of the efforts in succeeding a SS strategy implementation, within compiled information of 17 case studies out of 15 regions, of the 12 countries portrayed in OECD (2013), "Innovation-Driven Growth in Regions: the Role of Smart Specialization". In the second part we encompass a bibliometric account of the field offering both a qualitative and quantitative account of the state-of-the-art of SS literature based on bibliometric methods, by explicitly addressing the roots, evolution and influence of this literature.

The exercise showed that the first scientific publication on SS appears in 2011, and that the rate of published articles showed a noticeable increase in the year of 2014, probably related to the fact that SS is a mandatory condition for European countries appliance to the new structural and investment fund, the Horizon 2020, which will rule Europe economic investment from 2014 to 2020. We further concluded that the main topic addressed by SS literature comprises innovation and policies approaches through innovation, which is the great flagship of SS. Key authors both in terms of publications and citations coincides which means that SS literature is to a large extent self- referential. The most influential studies comprise some grey literature basically commissioned by policy making and decision making bodies, which confirms the above finding that SS involves practical policy instruments.

Reviewing qualitatively and quantitatively the SS literature it was clear the fragmented information concerning this approach/concept. Researchers are still converging to one concept definition, and apparently no distinguishable core theoretical approaches emerged from the study of the roots of SS

Keywords: Smart Specialization, Horizon 2020, Bibliometrics, Roots, Influence

JEL-Codes: R11; O10; O30; O31; C89

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1. Introduction

When Janez Potocnik began his functions as commissioner for Research of the European Research Area (ERA), in 2004, he implemented, one year later, an advisory group of 17, prominent academic economists, specialists in European Issues and policy challenges, called the 'Knowledge for Growth (K4G)[1] group' (EC, 2008).

In April 2006, the K4G group published their first policy brief where they recognized a response need concerning the attractiveness of European region for both foreign and domestic R&D investment and its absorptive capacity. When comparing the different approaches of US versus European market regarding the correlation between economic growth and R&D investments they concluded that "…Europe is not taking part as it should do in the Knowledge economy game" (K4G, 2006: 6). Specifically, the US' R&D intensity, 30% above EU (EC, 2008), and a strategic focus towards R&D compared high with the Europe 'neutrality principle' for funds distribution. It was then clear that Europe had to be able to implement an innovation strategy based on its strengths in the "*right fields of specializations*" (K4G, 2006: 14). These 'right fields of specializations' (K4G, 2006) evolved to the concept of Smart Specialization (SS), which emerged in 2008 as the leading idea of the K4G group (Foray et al., 2009).

According to Foray et al. (2009; 2011), SS involves an essential 'entrepreneurial process of discovery' by individuals and organizations. However, such bottom-up approach should not constraint policy programs, which ultimately might foster specializations itself. That said, and as SS is not limited to be an exclusive bottom up or top – down approach, "smart specialization need to be more sophisticated than thinking within the confines of this dichotomy will allow" (Foray et al., 2011: 10). It assumes a joint effort of all engaged actors in a strategic vision towards a sustainable knowledge growth (Benner, 2013).

Smart Specialization (SS) is a political approach that measures the importance of research development and innovation in a regional, national inter-regional or inter-national context. It is also a new label, but not a new concept, (e.g., Foray et al., 2011)

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[1]K4G is composed by: Professor Bart van Ark (Dutch); Professor Maria Carvalho (Portugese); Professor Paul A. David (American); Professor Jean-Paul Fitoussi (French); Professor Dominique Foray (French); Professor Anastasios Giannitsis(Greek);Dr. Marianne Kager (Austrian); Professor Bronwyn H. Hall (American);Dr. Georg Licht (German); Professor Jacques Mairesse(French); Professor Ramon Marimon(Spanish);Professor Stan Metcalfe(British)Professor Mojmir Mrak (Slovenian); Professor Dariusz Rosati(Polish);Professor Mary O'Sullivan(Irish);Professor André Sapir(Belgian); Professor Reinhilde Veugelers(Belgium).

The novelty comes with a new vision of research and innovation appliance and effects, considering a regional dynamic environment and not only its core activities sector, (McCann and Ortega-Argilés, 2011). The concept has deeply influenced European policy making. The development of '2020 vision' is carried through SS in a way that it became the central pillar of the new 'Europe 2020 strategy' as a mandatory conditionality for all European members who consider the application to the 7º Strategic Framework , on the leading program 2014-2020, named Horizon 2020, as a primary economic and social growth strategy. (Sandu, 2012; Koumparou, 2013; Benner, 2013; Tolias and Emmanouilidis, 2014).

The Horizon 2020 is Europe's largest Research and Innovation funding program ever, with nearly €80 billion, betting on Europe's global competitiveness and economic growth.[2] Within it, SS is a mandatory condition for country members appliance to Horizon 2020 (McCann and Ortega-Argilés, 2011; Benner, 2013; OECD, 2013; Carayannis and Rakhmatullin, 2014), therefore a relevant and emergent topic both at scientific and political practical level.

The SS concept has evolved from an academic idea to an important political instrument (Foray et al., 2011). Supportive instruments towards the development and sustainability of SS concept are blooming. A long with political regulations, it was also created a supportive web platform, named 'S3 Platform'. This platform, aims to integrate all countries, not exclusively European ones, constituting an important and helpful instrument created by the EC, launched in June 2011. S3Platform seeks to be the guideline for regions research and innovation design, providing a link information connecting regions[3], fostering policy makers towards sustainable development of new Smart Specializations Strategies, always focusing on three priorities: smart, sustainable and inclusive growth, currently known as the S3 Principle, (Carayannis and Rakhmatulin, 2014). The information provided on the S3 platform is still a work in progress. For the time being the regions involved are still documenting their smart strategies has it is a very extensive and profound work. Another referential instrument is the RIS 3 Guide. The RIS 3 Guide describes the meaning and the importance of these three priorities in the Europe 2020 policy (EC, 2012). It states that in order to respond to the economic crises, Europe will have to grow *smarter*, and this means, to deeply

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[2] http://ec.europa.eu/programmes/horizon2020/en/what-horizon-2020, accessed on 2015, July 21.

[3] So far, Portugal is one of the fifteen (out of the 28) EU member states registered in S3 platform. This represents the involvement of seven more countries when compared with 2013.

increase investment in research and innovation. Ultimately it will foster the discovery of new efficient resources, creating a greener, competitive and therefore *sustainable* economy growth. Completing the strategic priorities cycle, Europe '2020 vision' aims at territory cohesion, strengthening economies ties, by fostering a high employment rate, reducing poverty, gender discrimination, social, and territorial disparities, will lead to an *inclusive* growth (EC, 2012).

In the present study we undertake two separate but interconnected exercises.

First, we detail the scarce empirical evidence that exist on the subject by analyzing 17 case studies of countries' and regions' experiences, gathered by the OECD in of its report entitled "*Innovation - Driven growth in regions: The role of Smart Specialization*" (OECD, 2013), and provide a structured vision of the ways or attempts of implementation of SS strategies in order to understand the process of choice by regions of a key dimension of SS strategies. In methodological terms this involves content analysis of the referred cases.

The SS is a fundamental concept on the basis of the European structural fund for the program 2014-2020. However despite its policy relevance some (e.g., Asheim, 2013; Pugh, 2014) contend that this concept/approach is 'old wine in new bottles'. Also Dominique Foray (considered the father of SS) states that the approach is not scientifically new, but argues that concept carries novelty, and that this novelty lies on the 'analytical description' of the subject moving application from a sectoral view to regional context (Foray et al., 2011) and the way it has affected 'policy making' concerning research and innovation strategies (McCann and Ortega-Argilés, 2011). Given this debate, it would be illuminating to assess the scientific roots of SS related literature, uncovering potential schools/theoretical approaches that underline the concept – e.g., . 'National Systems of Innovation', 'Regional Systems of innovation', (McCann and Ortega-Argiles, 2013; Camagni and Roberta, 2013; Navarro et al., 2014), the 'Innovative Milieu' (Vittoria and Persico, 2014); the 'regional clusters' (Clar and Sautter, 2014; Horvat and Bogdanic, 2014), or the 'Triple helix model' (Carayannis and Rakhmatullin, 2014). Thus, the second exercise of the present dissertation involves a quantitative/bibliometric account of SS. Methodologically, it encompasses an extensive and detailed document search in two distinguished bibliographic databases, Scopus Sci Verse and Web of Science. Then, the abstracts (and in some case the complete paper) of all documents found are analyzed and classified by the type of paper (theoretical vs

empirical), the sub-topics, authors' schools and countries affiliation, the outlet and its scientific area and impact. We further study SS scientific roots to assess the extent to which citations are self-referential and which schools of thought are represented. This study will approach the main trends of SS research and its main scientific roots, for that we have developed two major bibliometric exercises: 1) main trends on SS: based on the analysis of the abstracts from all (72) articles published on SS found in the Scopus and Web of Science (WoS) bibliographic databases up to 10 August 2015; 2) the scientific roots of SS literature: citation analysis taking the references/citations out of 72 articles listed in the abstract database,[4] which generated a citation database involving 2645 citations.

This dissertation is structured as follows. In chapter two we present a literature review on SS. Section 2.1 presents SS concept definition; section 2.2 describes SS relation with the concepts of 'National and Regional Systems of Innovations', the 'Clusters Policy' and the 'Triple helix model'; section 2.3 details the main dimensions of RIS 3 framework and section 2.4 provides an account of the extant empirical literature. Section 3 describes the methodology of the research. Section 4 presents the bibliometric exercises, most specifically, the roots and range of influence of the SS literature. Section 5 concludes presenting the main results and limitations of our work.

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[4] Some papers were not publicly available, so it was not possible to gather the corresponding references.

2. Literature review

2.1. The concept and main dimensions of Smart Specialization

Smart Specialization (SS) is "a regional policy framework for innovation driven growth", (OECD, 2013: 11), that meets and integrates the core Europe 2020 strategy which compels for smart, sustainable and inclusive growth as a mandatory condition for EU member states appliance to the European structural Funds in 2014-2020 Program, (McCann and Ortega-Argilés, 2011; Benner, 2013; OECD, 2013; Carayannis and Rakhmatullin, 2014). It started to be an academic idea that rapidly emerged as a political instrument ruler and sustainer of innovation policies (Foray et al., 2011).

SS is a regional or national strategy that involves an analytical process, perceiving the core regions' potentialities, that, supported on research and innovation, will maximize regions' economic growth and 'knowledge-based' development (Midtkandal and Sörvik, 2012). But Smart Specialization can also be seen in an inter-regional context, leading regions to joint efforts, like in the example of the states of Berlin and Brandenburg, today called "Capital Region Berlin-Brandenburg" (Eulenhofer et al., 2013) or even further in an inter-region cross border scenario, proven with 'DSP Valley', a cooperation technology network organization, linked by Flanders, Belgium and Eidenhoven-Brainport, Netherlands (van der Zee, 2013). The concept also include in its core, the notions of path dependency, related variety, and trial and error experimentation phenomenon, which stress the relevance of the 'entrepreneurial process of discovery' (Rusu, 2013). These notions sustain the referenced analytical process to be taken in the search for the Smart Specialization Strategy (SSS) to be implemented (Benner, 2013).

In Dominique Foray's book, "*Smart specialization opportunities and challenges for regional innovation policy*", to be launched in 2015, which we had the possibility to read the first pages, Foray, establishes that SS is not a policy pointer in each way to go, it does not suggest to a region or a country that they should choose one particular sector or core activity just because of its economic regional importance; rather, it aims to provide means to ascertain if that particular region would benefit from 'R&D and Innovation', and if so, devote and develop strategies, create 'new innovative solutions', join efforts to sustain and trigger this new achievements for economic growth and regional development, and in this sense be define as a SSS applied in a regional context.

2.2. SS and its relation with the Regional Systems of Innovation, and the Triple Helix approach

The intimate relationship of the concepts of SS, Regional Systems of Innovation (RSI), and the Triple Helix model (TH), obliges us to briefly specify their evolutionary connection, for better understanding their implications and goals. These approaches emphasize that the world is not static and it is egger for innovations, especially concerning policies fostering regions' economic and social development.

Regional Systems of Innovation (RSI), are policy considered since the early 1990s, (Cook, and Memedovic, 2003). The idea emerged from a broader concept, the National Systems of Innovation (NSI), (Iammarino, 2004), thus according to, Lundvall,(1992) in Cook and Memedovic,(2003), one of the first authors to write about RSI, Lundvall believed that RSI, lacked of an international or inter-regional innovation interaction perspective, and condemn to limited results. However, by millennium turn, European Commission opposing to NSI competitiveness weaknesses was enhancing regional innovation strategies, and cluster policies as a way to boost national economies, following the vision that, US leading position in innovation was due to regional and local innovation systems based on clusters, (Porter in Cook and Memedovic,2003R). Clusters are agglomerations contributing to the specialization of regions, they were considered has key element in leading regional economies by improving innovation and competitiveness of firms.

Roundabout 2008, the "K4G" expert group started promoting the importance of research and innovation to be included in regional systems, which led to the acronym RIS, or Research and Innovation Systems (Carayannis et al., 2013). The Basque case it is typically considered by the literature as a strong example of a RIS (Navarro et al., 2014).

From what has been exposed, in an evolutionary perspective, Regional Systems of Innovation (RSI), derives from National Systems of Innovation, that later in time, aggregate the perceived need of research and innovation within the regional system. Here is born a new acronym, Research and Innovation System (RIS), which later aggregates Smart Specialization (SS) concept, and is presently known as Research and Innovation Smart Specialization Strategies (RIS 3).

Figure 1, aims at representing the evolutionary path of regional systems of innovation, political discussed and implemented in the beginning of 1990 towards research and innovation smart specialization strategies for 2020 horizon.
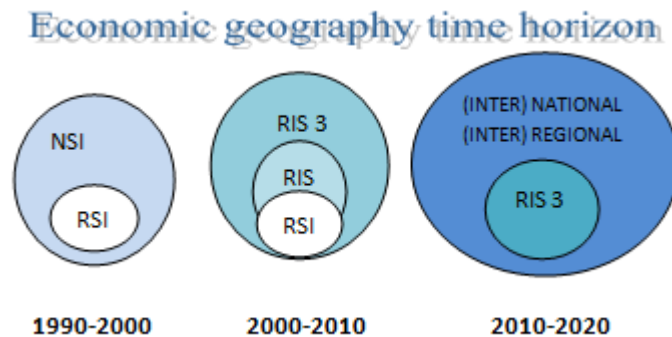
Figure 1: The evolutionary path of regional systems of innovation
Source: Author's

The Triple Helix approach, (TH), was also used as a regional development strategy, and forwarder of the 'knowledge-based economy' (Carayannis and Rakhmatullin, 2014). Ultimately, it refers to the interrelation between Universities; Industries and Government, as a dynamic model that "alternates between a number of bilateral and trilateral spheres" (Etzkowitz and Leydesdorff, 2000, in Carayannis and Rakhmatullin, 2014:7).

SS comes out as an evolution of the TH model, being denominated by Carayannis and Rakhmatullin (2014) as the 'Quadruple helix', since it includes in its core one more helix: the 'civil society as innovation users', or co- creators, and appliers of knowledge that will favor the 'entrepreneurial process of discovery' (Carayannis and Rakhmatullin, 2014). This is a notion also endorsed in RIS 3 Guide (EC, 2012). The evolution of this concept allows us to understand the mixed bottom up (civil society) and top down (Triple Helix) approach engaged in SS (Carayannis and Campbell 2012, in Carayannis and Rakhmatullin, 2014). Nowadays, Carayannis and Rakmatullin, (2014) are already recognizing the existence and importance of all endogenous and exogenous environmental dynamic interaction, adding it to this evolutionary model, as one more helix, naming it The Quintuple Helix model.
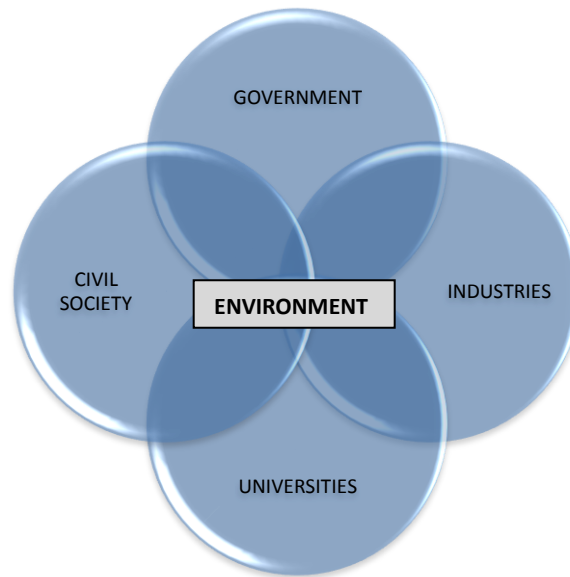
Figure 2: Illustrative picture of Quintuple Helix Model

Source: Author's

2.3 RIS3 Guide – framework suggestion for SS implementation

In May 2012 the European Commission launched a guide for Research and Innovation on Smart Specialization Strategies, the RIS 3 guide. Although it is not a mandatory condition to analyze and sustain regional strategies through the framework presented in this document, it is important to reference that RIS 3 Guide compels an assessment structure that details how regions can better analyze their uniqueness and strengths, and in what sense can it be considered a Smart Specialization Strategy. RIS 3Guide reflects the degree of political involvement and the evolution of the academic concept to a political instrument, (Foray et al., 2011), currently in use.

Since this orientation is most important, and in order to better understand the process of identification and implementation of a Smart specialization Strategy, we present an illustration, and a brief description, concerning a follow up, of a six-step Design. This six-step process follows a transversal and fundamental idea of a region smart, sustainable and inclusive growth).

Figure 1 is based on a presentation made by Ruslan Rakhmatullin in Lisbon on 26-28 March 2013, entitled "*RIS3: Research and Innovation for Smart Specialization*",[5] and it clearly describes the involvement of the 6 major phases detailed in RIS 3 guide: Region context analysis; Governance structure and engagement; Future vision of the region;

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[5] Available in http://s3platform.jrc.ec.europa.eu, accessed on 30/11/2014.

Selecting priorities for S3 implementation; Policy mix and action plans, and, finally, monitoring results. It also provides the visual knowledge of the intimated relationship between each step and their constantly interaction with the environment.
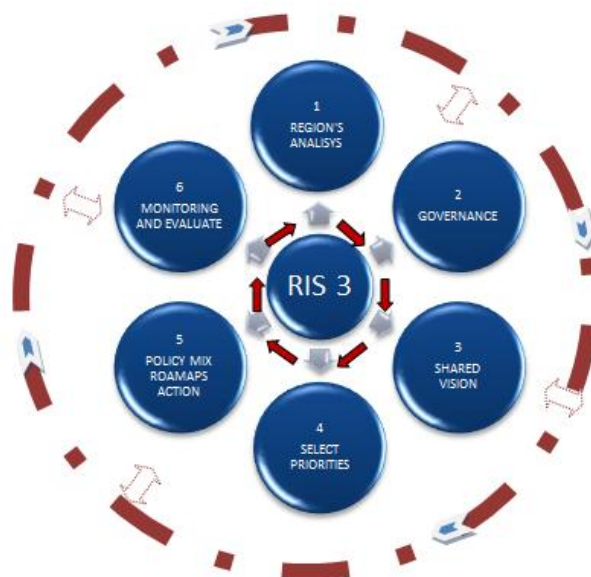

Figure 3: RIS3 as a process
Source: Adapted from Ruslan Rakhmatullin in Lisbon on 26-28 March 2013.

Table 1, summary describes the process anatomy of a Smart Specialization considered and , fully explained in RIS 3 guide. More detailed explanations on each step design are presented in Annex A.

Table 1: The process anatomy of a Smart Specialization strategy

Process Step	Description
Ananlysing	Region S3 identification starts with an exhaustive internal and external environmental analyses that covers three main dimensions: region assets (social and economic strengthens and uniqueness); connectivity and global economic position; entrepreneurial environment dynamics.
Government role	Governance structure and engagement is determinant in fostering the creation and in creating itself policies instigators of Research & Development & Innovation and boosting entrepreneurial environment. The interconnection between public authorities, universities and other actors of knowledge, investors, organizations, international expertes, and civil society, from within and outside the region, are welcomed in this interactive process.
Share Vision	Region must aim for international positioning, selling their own vision and attracting the biggest number of Stakeholders. This is a highly political step and the basis for strategy implementation. Region can create a tri-dimensional graphic reflector of the three main dimensions of EU 2020 strategy (Smart, Sustainable and Inclusive) of growth typology to classify and position itself.
Select Priorities	Very complex step, with a Key word "limited". Increase the focus on main capacities by limiting the number of fields of actions. S3 findings are hard to capture and measure, therefore rigorous and selective definition of chosen fields, supported by quantitative and qualitative information related to the region strengths and unique capabilities but specially aware on related emerging opportunities, and with broad vision (3° step) on international position, should be define.
Policy mix	This step is about documenting and tracing the baseline of the chosen S3 implementation. Designing and implementing new studied policies will foster S3 with credibility and therefore attract more and new stakeholders.
Monitoring	Monitoring and evaluating the strategy performance and development will maximize the probability of success of all the timeline objectives within the regional or national multi-annual action plan. In order to measure, strategy needs to be clear stated and objectively defined, but not static or rigid.

2.4. An account of the extant empirical literature on SS

Selecting region's priorities towards a strategy of smart specialization is a much complex task than it might appear. In fact, it is considered one of the six challenges portrayed in European Commission report "The Role of Smart Specialization", where "The "prioritization" challenge: How to select (and justify) priority intervention and domains for S3?", (EC, 2013: 22) is the first challenge on the list.

In order to better understand this process, we performed a content analyze of 17 empirical cases studies registered in the 2013 OECD report. A detailed analyze is presented in Appendix B.

Within all seventeen cases analyzed only 5 regions/country case studies - UK; Austria Upper and Lower regions; South Moravia in Czech Republic, and Flanders region in Belgium - referenced how the selection of priorities happened. Others such as Australia, Turkey and Korea, present defined activities/priorities but do not mention what were the bases of their choices. In the vast majority of the cases the selected fields are identified but no explanation is given on how that selection took place, or what actors were involved in that decision process. We observe that in only 5 cases studies out of 17, the process of field selection was explicit on explaining how they reach today's region priority activities. Other four haven't supplied any information on how the selection process occur; the remaining 8 cases present a fuzzy and not complete explained field priorities selection processes. In these latter cases, in some regions (e.g., Andalusia in Spain and East Marmara in Turkey), field priorities are perceived based on the notions of historical past dependency and related variety.

Thus, as stated earlier in our work, Smart Specialization concept has implicit the notion of past dependency and related variety. So even if the case studies do not refer how did the process of selecting priorities happened, in some cases, namely in Andalusia (Spain), it is implicit its historical past dependency on the Aerospace cluster, with almost one hundred years, and the associate acquired knowledge and infrastructure, as well as the experience and network that led the region to its choice. In East Marmara (Turkey), there is an explicit lead sector and strong related variety, adding value in all supply chain; although it was not mentioned the selection process, we easily perceive the automotive activity as the priority of smart specialization.
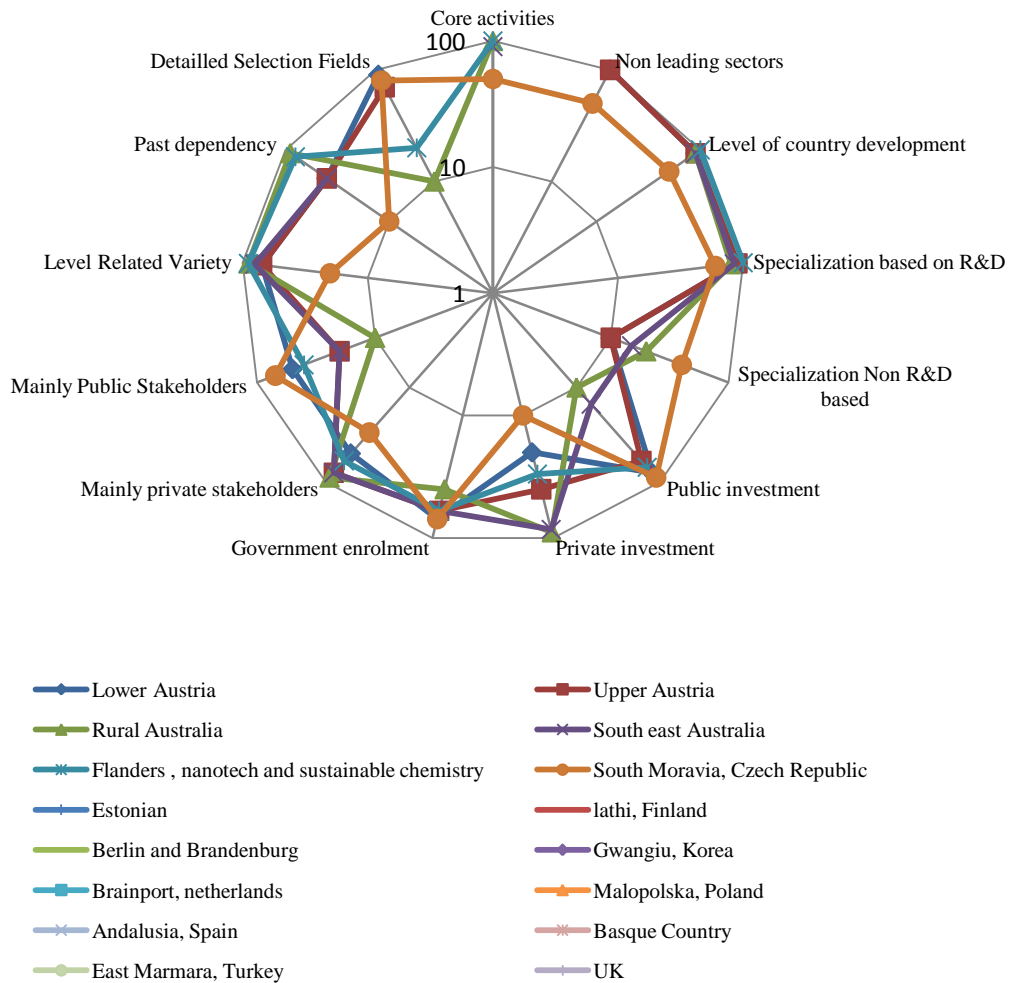
Figure 4: Summary analyze of case studies portrayed in the European Commission report "The Role of Smart Specialization", where "The "prioritization" challenge: How to select (and justify) priority intervention and domains for S3?"

Source: Author's

Thus, selection priority fields of action are a process that needs to be seriously taken into account in order that the region focuses on its strengths, uniqueness and competitive advantages. For instance, in Flanders (Belgium), and for the Nano-Technology (related to Health), the region developed a custom made tool to assess itself, the tool present the region strengths, and gives a future prognoses for possible strong areas. Lesson learned in the Estonian case study, a deeply dependent country of European Structural funds for country development, entails that the country's small size might act as a constraint to several priorities selection; thus, Estonia must concentrate and focus on few but broad priorities in order to overcome country size and turn it into an advantage (Seppo et al., 2013).

3. Methodology

To provide additional insight on the main trends of SS research and its main scientific roots, we have developed two major bibliometric exercises: 1) main trends on SS: based on the analysis of the abstracts from all (72) articles published on SS found in the Scopus and Web of Science (WoS) bibliographic databases up to 10 August 2015; 2) the scientific roots of SS literature: citation analysis taking the references/citations of 72 articles listed in the abstract database,[6] which generated a citation database involving 2645 citations.

As a basis for gathering the references, we used the SciVerse Scopus and ISI Web of Science (WoS) bibliographic databases. Bibliometric studies are, in general, based on three main sources of data: the ISI Web of Science (WoS), Google Scholar (GS) and Scopus. WoS is the oldest citation resource, containing the most prestigious academic journals, whereas GS and Scopus appeared in 2004 (Adriaanse and Rensleigh, 2013). Adriaanse and Rensleigh (2013: 741) demonstrate that "Scopus performed better (surpassed) WoS and GS regarding inconsistencies [incorrect title, -author, -volume number] encountered during the completeness and quality of the content verification process." Besides retrieving multiples copies, GS also yields the most inconsistencies. Comparing the strengths and weaknesses of the three databases, Falagas et al. (2008) conclude that GS, although providing the retrieval of more information, is marred by inadequate, less frequently updated, citation information. They further add that, compared to WoS, Scopus covers a wider range of journals, including more articles, but is currently limited to recent articles (published after 1995). Based on these arguments, we opted to use Scopus and WoS as bibliographic databases in this study.

The search keywords (in the fields 'keywords', 'article title' and 'abstract') used were 'smart specialization' or 'smart specialisation'.

This search yielded 72 articles published between 2011 and 2015. We downloaded the articles and analyzed each abstract (in some cases, the full paper). The articles were then categorized according to their main topic, type of article, unit of analysis, and countries of analysis.

With regard to the main topic, and following the literature briefly reviewed in Section 2, the articles can be classified into one of the following categories: 1) conceptual;

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[6] Some papers were not publicly available, so it was not possible to gather the corresponding references.

2) Europe 2020 Strategy; 3) policy approach to/through innovation; 4) regional economic development; 5) regional innovation policies ; and 6) other. Trough this classification, we assessed the relative weight of each topic of research and, most important, inferred the trends in SS.

The classification according to type of article (i.e., appreciative (including surveys), empirical, and formal) follows the distinction proposed by Nelson and Winter (1982) in terms of 'formal' and 'appreciative' theorizing. In an attempt to clarify the difference between theoretical arguments that follow a mathematical logic and those that do not imply any modellization, these authors suggest that 'formal' includes 'logically structured theorizing', whereas 'appreciative' comprises a 'more intuitive' form, based on 'judgments and common sense' (Nelson and Winter, 1982: 9). Therefore, in the present paper, and following the elaboration made by Silva and Teixeira (2009) upon Nelson and Winter's contribution, the articles classified as 'appreciative' included critiques, judgments, appreciations, appraisals or theoretical arguments; in this category we also included 'survey' type of articles, which involve the documentation of a comprehensive review of the published and unpublished work from secondary sources data in the areas of specific interest to the researcher. The articles characterized as 'formal' contained mathematical models or were based on an analytical or logical framework. If the article was only (or substantially) concerned with the econometric or statistical testing of data, we classified it as 'empirical'.

Empirically-based articles were further examined in terms of the unit of analysis, which encompasses the municipality, regions (NUTs I, II or III), or country levels. We further identify the country(ies) that was(were) the target of empirical articles.

In order to provide a full picture of the works published on SS, we additionally compute two sort of rankings: the most prolific authors and well as the main outlets (mostly journals), its research area and scientific impact, where these articles were published.

The second database (the scientific roots of SS) consisted in performing citation analysis taking the references/citations of 72 articles listed in the abstract database. More precisely, a comprehensive analysis was conducted of the 2645 references cited in all articles published to these articles. These references were collected from Scopus and WoS taking from each of the 72 articles individually considered. In some cases (articles in press or those articles from WoS) it was necessary to perform a time consuming

copy-and-paste procedure. Given that the references were not uniformly cited in each of article, we then had to harmonize the references and only afterwards perform the citation analysis.[7] Such a quantitative analysis helped to identify the most influential works in this area of research, the most influential areas of studies (through journals cited), as well as the most influential authors and schools. Such an exercise provided important clues on the clustering of contributions.

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[7] Such a painstaking, time-consuming effort was needed in order to rigorously account for the main contributions, both in terms of articles and authors (first and other authors). For instance, in terms of automatic procedure, WoS only provides information on the first author, therefore supplying an incomplete picture of authors' contribution to the area. Moreover, often authors' names are not harmonized, which induces a lot of errors in counting the number of times a given author is cited.

4. A bibliometric account of SS-related studies

4.1. An overview of the studies published on SS

The evolution over time of articles published on SS is growing. Until now we register 72 scientific articles concerning specifically to SS topic.

The evolution of the literature on SS indexed in Scopus reflects a clearly upward trend – from 3 papers published in 2011, the year of 2014 encompasses 39 articles. Such an exponential rise evidences the growing interest this topic has received in recent times, particularly related to the use of SS as a political instrument/strategy for fostering smart sustainable and inclusive strategies since the implementation of the 7º structural and investment funds.[8] Such positive trend is also verified when one compares the dynamics of the publications focusing on innovation with the restricted set of SS literature – see Figure 5.
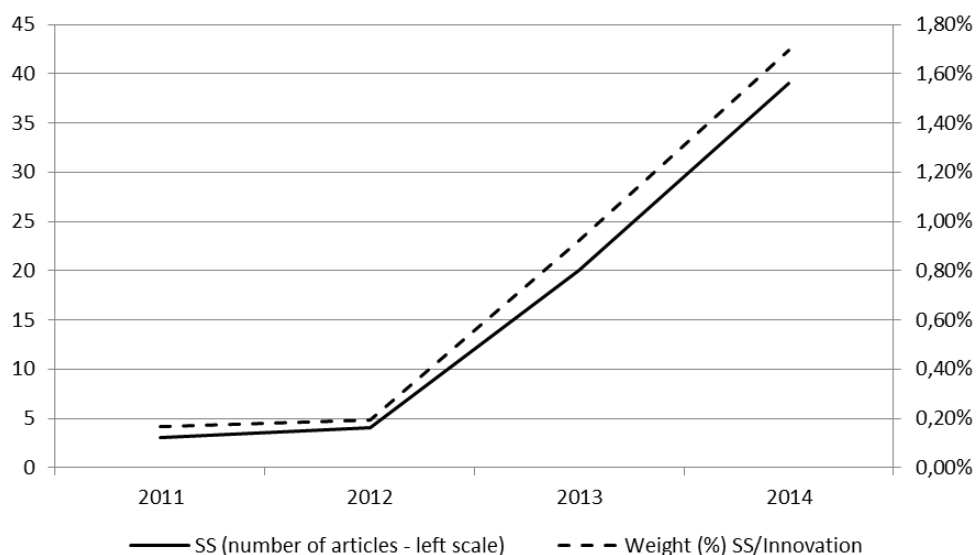
Figure 5: Journal articles published on SS, by year, 2011–2014

Notes: The 72 articles on SS were obtained from the WoS and Scopus bibliographic databases using Smart Specialisation and its variations as search keywords; the number of articles published on 'Innovation' (search in keyword), 2011–2015, in the areas of 'Business, Management and Accounting' or ' Economics, Econometrics and Finance' were gathered from Scopus (period of reference 10 August 2015).

The bulk of SS literature presents an appreciative nature (see Figure 6). In 2014, almost 70% of the studies published in sources indexed in Scopus were appreciative. The share of empirical studies is quite reduced (less than 10% in 2014). Thus, it is apparent that

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[8] A lot of grey literature on SS, non-indexed is Scopus, is available, especially including policies briefs, reports and policy manuals. This obviously constitutes an important limitation of the present analysis.

the scientific growth of this literature necessarily requires more empirically led research.
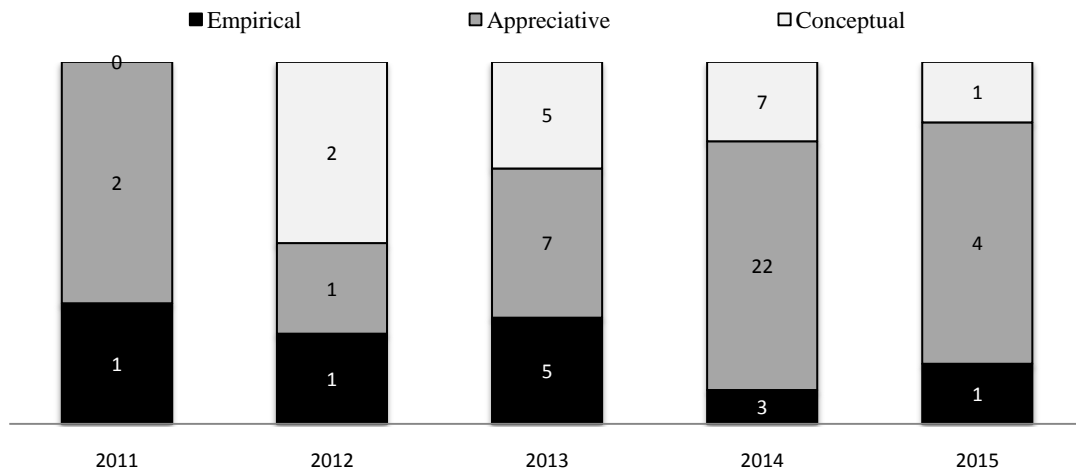
Figure 6: Main types of studies in SS literature

Notes: Own elaboration based on data gathered from Scopus (period of reference 10 August 2015).

In terms of topics, the SS studies address mainly issues regarding innovation and innovation policies (64%). Economic development of regions and countries is the central issue in 18% of the studies whereas the remaining shares encompass papers concerned with the conceptualization of SS (7%) or the relation of SS with the European 2020 strategy.[9]
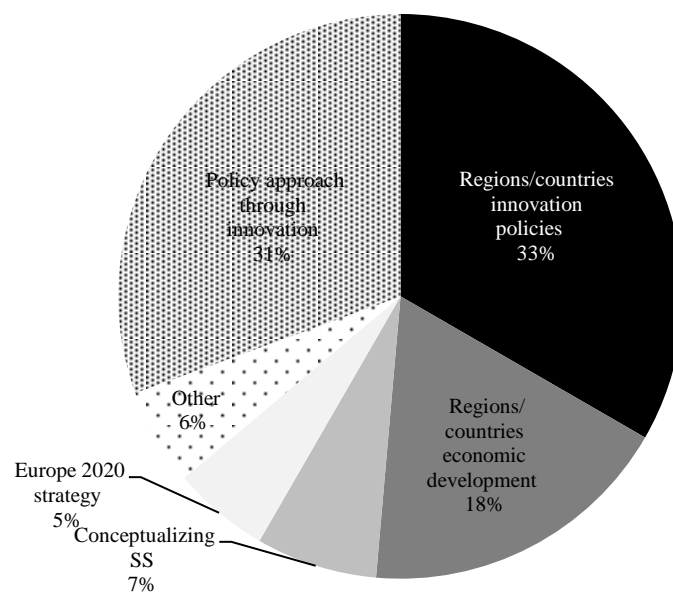
Figure 7: Main Topics addressed by SS Literature

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[9] For more detailed information about the topic and the units of analyses see Appendix C.

SS literature involves 149 authors, with Raquel Ortéga-Argiles and Philippe McCann being the most prolific authors with 6 written papers in the area. Both authors are affiliated to the Rijksuniversiteit Groningen, Economic Geography department in the Netherlands. Philip McCann is one of the world's most highly cited economic geographers and spatial economists of his generation. It is also relevant to say that McCann was an International Expert member of the Barca Commission convened by the European Commission to report on the future of EU Cohesion Policy. Raquel Ortéga-Argiles was also a European policy researcher at the Joint Research Center of the European Commission (Seville, Spain), before her connection with the Rijksuniversiteit Groningen international university. MacCann and Ortega-Argilés are co-authors in all of the six articles mentioned. It is also important to say that Dominique Foray, also among the most prolific authors (see Figure 8), belongs to the group "Knowledge for growth", and is considered by many as the father of smart specialization topic (Navarro et al., 2011).
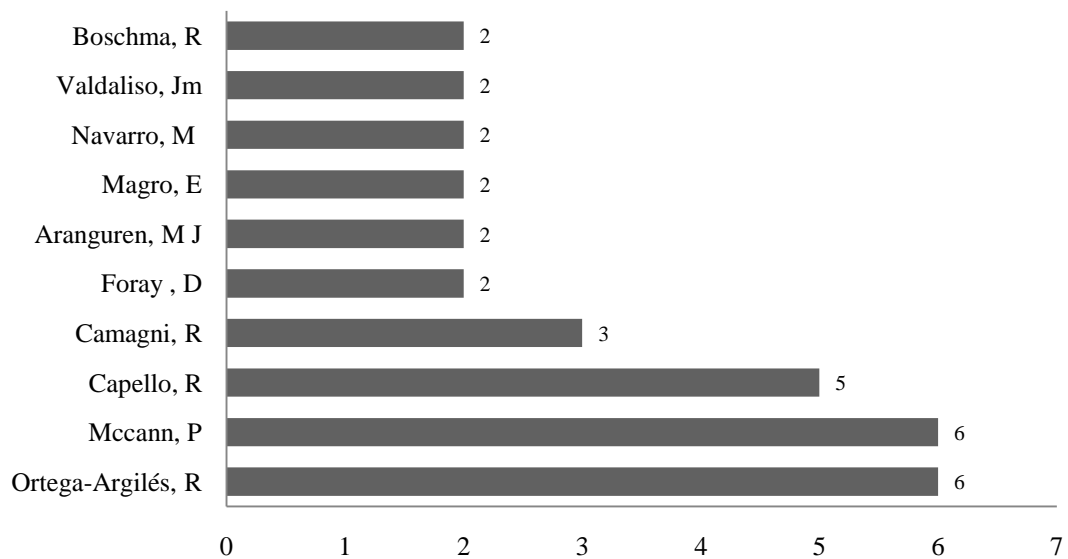
Figure 8: Top 10 authors in SS literature by number of articles published in the topic

The Top 10 most prolific authors on SS involved some highly influential authors such as (by decreasing order of citations) Ron Boschma, Philip MacCann, Roberta Capello, Roberto Camagni and Dominique Foray (Table 2).

Table 2: Rankingof the scientific visibility of the top 10 authors writting about SS

Rank	Author	Affiliation	Subject area in Scopus	Total citations in Scopus
1º	McCann P.	Rijksuniversiteit Groningen, Department of Global Economics and Management (The Netherlands)	Social Sciences, Economics, Econometrics and Finance	2610
2º	Ortega-Argiles R.	Rijksuniversiteit Groningen, Department of Global Economics and Management (The Netherlands)	Social Sciences, Economics, Econometrics and Finance	150
3º	Capello R.	Politecnico di Milano (Italy)	Social Sciences, Economics, Econometrics and Finance	1050
4º	Camagni R.	Politecnico di Milano (Italy)	Social Sciences, Environmental Science	920
5º	Foray D.	Ecole Polytechnique Federale de Lausanne (Switzerland)	Business, Management and Accounting , Economics, Econometrics and Finance	616
6º	Magro E.	Orkestra-Basque Institute of Competitiveness (Spain)	Social Sciences , Business, Management and Accounting	7
7º	Aranguren M.J	Orkestra-Basque Institute of Competitiveness (Spain)	Social Sciences , Business, Management and Accounting	59
8º	Valdaliso J.M.	Universidad del Pais Vasco (Spain)	Social Sciences , Business, Management and Accounting	32
9º	Boschma R.	The Urban and Regional Research Centre Utrecht (The Netherlands)	Social Sciences , Economics, Econometrics and Finance	4136
10º	Navarro M.	Orkestra-Basque Institute of Competitiveness (Spain)	Social Sciences , Environmental Science	64

Notes: Reference date for gathering the citations from Scopus was September 2015. Grey cells identify highly influential authors.

The 72 publications were published in 39 different journals – see Table 3.

Table 3: Top journals publishing scientific SS literature (ordered by number of publications)

Rank	Journal Title	Number of articles on SS	SRJ (2014)	WoS IF (2014)	Area of study (Scopus)	Area of study (WoS)
1	European Journal of Innovation Management	7	0.560	-	Strategy and Management	
2	Scienze Regionali	6	0.229	-	Geography, Planning and Development	
3	Journal of Economic Policy Reform	4	0.295	0.860	Business and International Management	Planning & Development
4	Local Economy	4	0.393	-	Economics, Econometrics and Finance	
5	International Journal of Knowledge-Based Development	3	0.276	-	Management of Technology and Innovation	
6	Regional Studies	3	1.465	2.068	Environmental Science	Economics; Environmental Studies
7	Journal of the Knowledge Economy	2	0.378	-	Economics and Econometrics	
8	European Planning Studies	2	0.805	1.228	Geography, Planning and Development	Planning & Development; Environmental Studies
9	Growth and Change	2	-	0.642		Planning & Development
10	Oxford Review of Economic Policy	2	0.554	1.042	Economics and Econometrics	Economics
11	Papers in Regional Science	2	0.686	1.012	Environmental Science	Economics; Environmental Studies

We verify a wide dispersion with 55 articles published in 39 distinct journals. Such dispersion seems to indicate that scientific borderline of SS area is yet to be clearly defined. The three journals that published more articles on SS are European Journal of Innovation Management, with seven published papers (15% of all journal publications), Scienze Regionali, with six published papers (13%), and Local Economy with four published papers (8%).

Figure 9 depicts the scientific visibility and recognition of the referred journals as reflected by the Scimago Journal Ranking (SJR) metrics. The Top 3 journals in terms of publications are indicated with a rectangle.
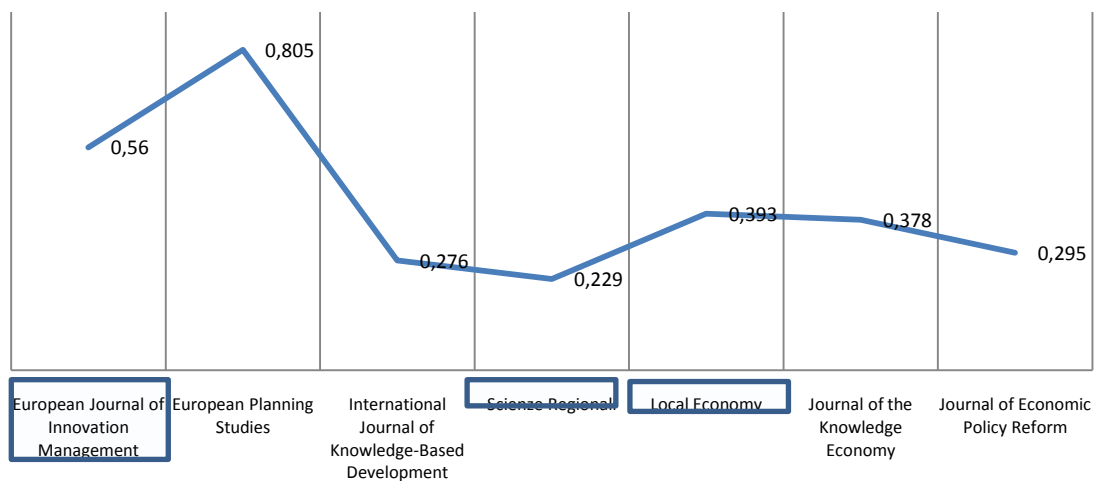
Figure 9: ISI rank of journals scientific visibility
Note: Reference date September 2015.

4.2. The scientific roots of the SS literature

From the 72 articles published on SS, we managed to download and gather the references (2645) of all papers. From each downloaded article we copied and pasted their references (citations) and re-formatted them to be able to treat them quantitatively.[10]

Most of citations are made to studies published in the last two decades (cf. Figure 10). Thus, SS scientific roots are relatively recent.

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[10] SciVerse Scopus and WoS automatically provide the references cited in each published article, but this automatic procedure misses hundreds of references. Thus we opted for the more time-consuming but more rigorous manual process.
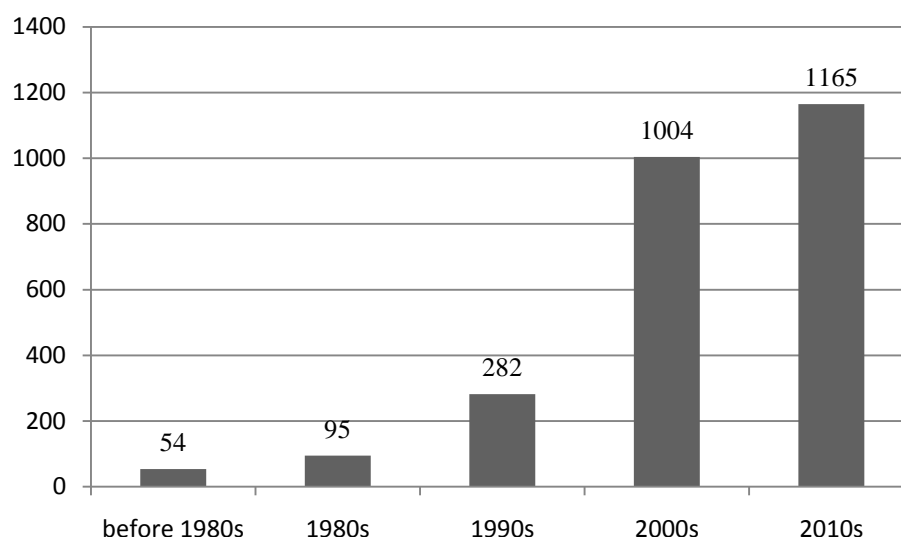
Figure 10: Citations made by SS literature by date of publication
Note: Reference date September 2015.

Among the most cited authors, that is those who mostly influence SS literature, stand the ones identified as the most prolific within SS (see Table 4). Thus, we might content that SS literature suffers from scientific endogamy, that is, most citations are self-referential.

Table 4: The top 10 most cited authors by the SS literature (ordered by number of citations)

Rank	Author	Affiliation	Times cited by SS literature	Number of citations by Scopus studies
1°	McCann P.	Rijksuniversiteit Groningen, Department of Economic Geography, Groningen	230	2610
2°	Foray D.	Ecole Polytechnique Federale de Lausanne, College of Management of Technology, Lausanne	120	616
3°	Boschma R.	The Urban and Regional Research Centre Utrecht	110	4136
4°	Ortega-Argiles R.	Rijksuniversiteit Groningen, Department of Economic Geography, Groningen	105	150
5°	David P.A.	University of Oxford, Oxford, United Kingdom	59	3246
6°	Hall B.	UC Berkeley; UK, National Institute of Economic and Social Research	56	3243
7°	Barca F.	Ministero dell'Economia e delle Finanze	45	122
8°	Cooke P.	Cardiff University; UC Bergen, Center for Innovation Studies, Bergen, Norway	45	4160
9°	Capello R.	Politecnico di Milano (Italy)	42	1050
10°	Landabaso M.	European Commission	41	168

Note: Reference date for gathering the citations from Scopus was September 2015.

Relatively to the most influential studies on the literature of SS, it stands out the large importance of the so-called grey literature (reports and policy briefs) – see Table 5.

Table 5: The top 10 most cited studies by the SS literature (ordered by number of citations)

Authors	Title	Year	Source	Times cited	Nº citations (Scopus)	Type
McCann P., Ortega-Argiles R.	Smart specialisation, regional growth and applications to EU cohesion policy	2013	Regional Studies	28	10	Article
Foray, D.; David, P.A.; Hall, B.	Smart Specialisation - the Concept	2009	Knowledge Economists Policy Brief Edição: 9	22	17	Policy brief
Foray D., David P., Hall B.	Smart Specialisation: From Academic Idea to Political Instrument, the Surprising Career of a Concept and the Difficulties Involved in its Implementation	2011	Smart Specialisation: From Academic Idea to Political Instrument, the Surprising Career of a Concept and the Difficulties Involved in its Implementation	19	14	Working paper
Frenken K., Van Oort F., Verburg T.	Related variety, unrelated variety and regional economic growth	2007	Regional Studies	18	41	Article
Barca F.	An agenda for a reformed cohesion policy: a place-based approach to meeting European Union challenges and expectations	2009	An Agenda for a Reformed Cohesion Policy	15	177	Report
Neffke F., Henning M., Boschma R.	How do regions diversify over time? Industry relatedness and the development of new growth paths in regions	2011	Economic Geography	11	34	Article
Todtling F., Trippl M.	One size fits all?: Towards a differentiated regional innovation policy approach	2005	Research Policy	11	87	Article
Asheim B., Boschma R., Cooke P.	Constructing regional advantage: platform policies based on related variety and differentiated knowledge bases	2007	Constructing Regional Advantage: Platform Policies Based on Related Variety and Differentiated Knowledge Bases	10	28	Article
Boschma R., Iammarino S.	Related variety, trade linkages, and regional growth in Italy	2009	Economic Geography	9	133	Article
Boschma R.	Proximity and Innovation: A Critical Assessment	2005	Regional Studies	9	39	Article

Note: Reference date for gathering the citations from Scopus was September 2015.

5. Conclusions

The year of 2008 marks the rise of a new political approach, focused on research and innovation applied on regions ''smart'' surroundings and not only on its core activities sectors (Foray, 2015), named Smart Specialization (SS) Strategy.

Based on an extensive literature review, we argue that SS encompasses a practical approach perspective, as it is a policy instrument (Foray et al., 2011).   Regions can use SS as tool for strategic economic growth and development model to access and measure their strengths and uniqueness (EC, 2011). Regions are monitoring their SS strategies, although it is not possible for now to measure and analyze results because the scarcity of empirical works on the issue.

It is clear that the Europe Commission (EC) is fully committed to SS political approach and believes it will favor a 'smart sustainable and inclusive' economic development and strengthen ties between all European territories. Thus EC is not sparring efforts and is continuously creating supportive instruments as the RIS3 Guide, the S3 Platform, the innumerous reports, strategic meetings and conferences with country members, actions compelling country members to run detailed endemic analyses to decide their prioritization fields for economic investment, and most important is creating funding systems in turn of this new political approach as the Horizon 2020.

From the bibliometric exercise performed we can also conclude that the main topic addressed by SS literature comprises innovation and policies approaches through innovation, which is the great flagship of SS. Key authors both in terms of publications and citations coincides which means that SS literature is to a large extent self-referential. The most influential studies comprise some grey literature basically commissioned by policy making and decision making bodies, which confirms the above finding that SS involves practical policy instruments.

Reviewing qualitatively and quantitatively the SS literature it was clear the fragmented information concerning this approach/concept. Researchers are still converging to one concept definition, and apparently no distinguishable core theoretical approaches emerged from the study of the roots of SS.

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Appendix A

1º **Analysing** the regional context and its pontential for innovation covering three main dimensions: regional assets (evaluate the regions's weaknesses and strenghts; key challenges for economic and social differentiation); world linkages and global economy position (specialy important for less developed regions), and entrepreneurial environment dynamics. The tools best considered for this first step are (with necessary adaptation for the main dimensions in study): swot analysis; regional profiling studies; targeted surveys and expert assessments; comparative studies; round of interviews; interregional work groups; technology auditing and setting up observatories. The guide reference Skane's innovation capacity[11] as an illustrative example of this first step.

2º Inclusive **Governance Structure** (that deals with policies developed by local, regional, national and european authorities), which in the Guide is sugested the use of an experimented typical RIS project, that can thus vary, composed by a Steering Group (roundabout 15 people, with all kind of actor engagnment, that consider the overall of the project); Managment Team (normally up to 4 people, responsable for implementing the project under the SG guidance), and Working Groups (thematic or project-specifc). The attention in this step is on defining the scope,"emphasize that innovation may occur everywhere, in different forms and not only in the form of high tecnhology development in metropolitan areas" (extracted from RIS 3 Guide, p. 34). Intervention of public authorities, universities and other actors of knowledge, investors, organizations, international expertes, and civil society, from within and outside the region, are welcomed in this interactive process. According to Rakhmatullin (2012) the second step is a good exemple of appling the Quadruple helix prespective. As an example for this second step, the RIS 3 Guide refers the West Midlands region.

3º Shared **Vision** on region's future aiming for international positioning. This is a highly political step and the basis for strategy implementation. It is about selling the idea 'ambitious but still credible' and attract regional stakeholders. To help policy makers and managing authorities to identify an overall vision, and have a clear position of the region, the authors of RIS 3 Guide suggest the creation of a three-dimensional graphic reflector of the three main dimensions of EU 2020 strategy achievements (cf. Figure A1): Smart, sustainable and inclusive growth typology.

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[11] In http://www.skane.se/Public/Skaneportalen-extern/Nyheter/Naringsliv/Dokument_Naringsliv/Action_plan090831.pdf , accessed on 1December 2014.

Smart Growth typology

| Non science & tecnology-driven | industrial production zones | Knowledge regions |

Sustainable growth typology

| Rural Region | Rural near urban region | Urban Region | Urban- Costal Region |

Inclusive Growth Typology

| Population decline and outfows | Population Growth and inflows |

Figure A 1: Main dimensions of EU 2020 strategy achievements

The guide refers Flanders[12] region (vision for 2020) as a good example of this step.

4º **Selecting** limited **priorities** for regional/national development. Very complex step, since S3 findings are hard to capture and measure. Policy makers must sustainably decide which fields will have privileged access to the structural European Funds. For that, and based on the previous depth analysis (1ºstep), a careful, rigorous and selective definition of chosen fields, supported by quantitative and qualitative information related to the region strengths and unique capabilities but specially aware on related emerging opportunities, and with broad vision (3º step) on international position, should be define. It matters the concept of differentiation. Regions must benefit from their assets and particularities and distance themselves of copying other regions strategy, thus take advantage of 'related variety principle'[13], especially if we talk about less developed regions or countries, (Pylak and Wojnicka-Sycz, (....). In OECD (2003), *"Innovation-Driven Growth in Regions: the Role of Smart Specialization"*, a helpful questionnaire for regions self-assessment is provided. These guiding questions will be the base for our interviews with Portuguese CCDR's. A reference to Berlin and Brandenburg[14] regions focus on priorities are the example chosen to better describe this process step.

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[12] http://www.flandershouse.org/pact-2020, accessed on 2 December 2014
[13] Definition of related variety in Boschma and Iammarino (2009).
[14] http://www.oecd.org/dev/50649698.pdf, accessed on 2 December 2014

5º Establishment of suitable **policy mix,** roadmaps and action plans. This step is about documenting and tracing the baseline of the chosen S3 implementation. The RIS 3 guide gives the example of "Regional policy for smart growth in Europe 2020", EC (2011), in a sense of inspiration (flagships of success) and guidance for design and implementation of new policies to foster S3. Defining and documenting provides to others, credibility and therefore the possibility of, attracting more and new stakeholders. The guide suggests the construction of a multi-annual plan, made by 'RIS 3 Management bodies, that shall include the following:

- Defining the general features and challenges to overcome of the chosen fields

- Defining projects execution

- Defining target groups

- Clear positioning of all actors role

- Defining ways to measure results

- Roadmap

- Identify funding sources

6º **Monitoring** and evaluation mechanisms. In order to measure, strategy needs to be clear stated and objectively defined, but not static or rigid. Regions can use known methodologies to monitor their RIS 3 development like a Balance score card, Peer reviews, a mix of different methodologies or they can create one that better suits their S3 needs, like Nanotech-for-health case in Flanders region. It´s important to realize that monitoring the strategy performance and development will maximize the probability of success of all the timeline objectives within the regional or national multi-annual action plan. The guide references Lower Austria[15] region as a good example of this process step.

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[15] http://www.knowhub.eu/static/global/media_catalog/2014/04/15/198/original.pdf?download=yes&filename=Balance+Scorecard+Lower+Austria.pdf, accessed on 2 December 2014

Appendix B

Table B 1: Process steps for implementing a regional Smart Specialization Strategy

Country/ Region	SS Core Activities	Region Characteristics (size/population; location; level of innovation; level of development)	Nature of the specialization: R&D based vs non-R&D based	Main stakeholder	1º step Analyze	2º step Government Interaction	3º step Vision	4º step Selection Fields	5º step Policy mix/action	6º step Monitor result
Australia, Rural	Grains Research and Development Corporation (GDRC), (primary industry-Agriculture)	More than 24000 grain growers Over 53% of Australia land is use for agriculture. Primary sector represents an important source of foreign income. Agriculture total value added sums 12% of GDP	R&D&I, investment of 451 million AUD (2009 findings) Developed RDC model that involves multiple stakeholders	Research and development corporations (RDCs); Australian Grain Growers and country government	Extensive and intensive collaboration between all actors through Grain value chain; Producers and researchers priorities are convergent; Farmers involvement is mandatory so GRDC funding is stable ; Strong network between peers, competitors and related industries; Open innovation (program logic approach)	Second lowest funding support in OECD countries (4% of farmers income)	Already existing international alliances, and Grains industry competition, that ensures innovation as a grower priority	"The Australian Government's guidance regarding RDCs research focus comes via national and rural research priorities... intentionally very broad leaving RDCs considerable autonomy in the selection of projects " GRDC strategic plan (2012-2017)identifies 6 strategic themes	GRDC yearly determines R&D priorities. Growers are constantly updated by performance reports, forums and an annual meeting 5 years strategic R&D plan are held considering medium and long term horizon; Growing strategy aligned with market requirements and stakeholders needs	Open innov programme approach ; Extensive consultation stakeholder monitors internationa developmen Periodic situ analyses;
Australia, south east Melbourne	South East Melbourne Innovation Precinct (SEMIP), supporting regional specialization	Melbourne is the state capital of Victoria and the second largest city of Australia. It has 1.4 million habitants (29% of Victoria Population) At its Innovation system the case study mentions CSIRO (commonwealth Science and Industrial Research Organization) and a strong private sector presence in advanced manufacturing	CSIRO(Australia national science agency) Highly skilled workforce	Industry government Research institutes	MSE is an intensive and advanced manufacturing region characterized by high-Tec SME's with most exportation on highest value added product.	Government role in creating the optimal conditions of liveability; and entrepreneurial acting. Melbourne's Australia cultivates a proximity culture (all kind of meet and greets) Thus government is not a controller organ since SEMIP acts independently from it	Connecting and interacting fostering knowledge sharing, problem solving and open innovation; Accelerating and strengthening business innovation capabilities ; Establishing world class regional facilities easy to attract and retain people to learn, invest and work	Case study makes no reference concerning this process step	Establishment of formal and informal networks to foster stakeholders participations and international relationships; Capturing and disclosing success stories; Long term agreements in buying on domestic market ;	Regional innovation a specializatio strategies an regularly re SEMIP con the followin metrics : B2 B2R; R2R;R2C;B Qualitative analyses "re success stor
Austria, Lower	Policy mixes for Smart Specialization (creating industrial/science interactions in region without lead sectors)	With 4 Technology Centres; 7 start-up centres, 17 business parks; 776 companies and 18300 employees, Lower Austria is characterized by the distribution of economic and research capacity in several small and medium sized locations. Geographical proximity to Vienna and by its integration in "Vienna Region" and CENTROPE region R&D activities are spread through different sectors. And SME are largely engage in Innovation activities	Knowledge intensive economy (not specialized on explicit lead sectors but on functional priorities like Technopols and clusters)	Enterprises Research and Technological centers Government	Between 1999-2008 RIS was the innovation policy implemented. Currently and based on smart specialization approach the region is under the named Economic Strategy Lower Austria L. Austria deeply benefits of its geographic location and created intra and interregional collaboration Hybrid approach	Supportive governance (creator of soft measures to support R&D&I)and funding schemes and financing instruments	Pursue target to position itself more broadly and focus on innovation	Case study refers that L. Austria as gone by extensive prioritization processes thanks to several strategic exercises (SWOT analysis; questionnaires to companies; organized workshops; interviews with stakeholders; survey of activities in similar regions) in result Lower Austria achieved priorities selection and aimed at excellence through a response to its market need (HTec-infrastructures)	Economic Strategy Lower Austria , defines the Policy mix and Budgetary, Priorities target, Innovation and Technology, Qualification, Cooperation, Internationalization, Star-ups, Sustainability The main Key policy instruments are divide in Infrastructure; Advises and services and finance	Monitoring being held a level approa 3 target gro Project leve support serv financial fu Programme (like balanc scorecard) a Regional Le like statistic analysis and comparison

Country/ Region	SS Core Activities	Region Characteristics (size/population; location; level of innovation; level of development)	Nature of the specialization: R&D based vs non-R&D based	Main stakeholder	1º step Analyze	2º step Government Interaction	3º step Vision	4º step Selection Fields	5º step Policy mix/action	6º step Monitoring results
Austria, Upper	Smart governance for Smart Specialization	Considered a networked regional innovation system , with well developed technology clusters and with formal connecting procedures within all important actors, Upper Austria is a province in the heart of Europe with an (technological) export oriented economy, with a very strong industrial core	Technological intensive economy, specialized in functional priorities and technologies rather than specific sectors (like lower Austria region)	80% of R&D is lead by industry We can thus refer Academia and Government	However growing, Upper Austria needs to reinforce its public investment in R&D and strengthen its university sector, in order to make them a strong point like economic and industrial sectors. Lack of critical mass on human capital in public R&D Upper Austria is Austrian leading region in technology export	Governance structure allows a hybrid approach with enrolment of civil society	Upper Austria will (like in Lower Austria case), continue to pursue the objective of position itself more broadly and to focus on innovation.	Upper Austria uses a continuous process of potential growth identification. Priority areas are mainly defined by stakeholder consultation, studies and analysis of regional requirements, like regional assets and existing capacities, as well on the analysis of megatrends. It's a collaborative approach of decision-making. Case study refers that U. Austria didn't blindly copy big global topics, and double bet its strong points.	Close cooperation with neighboring and partners regions; interregional networks and working communities; bilateral region cooperation (Bavaria and south bohemia), and country collaboration(Croatia, Israel..), and intensive cooperation with east and southeast EU members. Upper Austria creates European Region Danube-Vltava in order to keep strengthens ties.	Monitoring as b done at Project level (like supp service and funding); at Program level (with companies surveys and objectives evaluation) and Institutional lev statistical analy R&D survey)
Belgium , Flanders	Nanotech-for-Health (NfH) IMEC (is an independent research institute in nanotechnology, and notable reference in its field of action that grow strongly due to an unique open innovation model) VIB (biotechnology and R&D institute)	Inter and intra sectoral support; strong evidence on related variety; Two of worldwide biggest institutes in Nanotech and biology; exceptional clinical infrastructures; top research teams allocated in region universities; Belgium is responsible for 16% of Europe's biopharmaceutical industry . Key player at world level	Intensive R&D Is the region large enough to face alone all necessary investments in an uncertain economic field (experimental domain)	IMEC (strong technology actor; key player); VIB	Diversification strategy; Unique platforms and competences of research in nanotechnology and strong related variety links (in biotechnology, health and medical devices) Flanders region as the knowledge and means to act as a smart specialist in nanotechnology at European and global level Fuzzy diversified and cooperative technological cluster	Background involvement; Need of multi-governance approach in order to become a representative region globally. Public – funding Recognizable openness and support to bottom-up approach	International classification of NfH as an emergent market; Opportunity to combine new areas like ICT and pharmaceutical; Health domain is considered a 'societal challenge' Aligned the sector with EU developments	Why to choose nanotechnology field of action towards smart specialization seams implicit (infrastructure, past experience and accumulated knowledge; recognizable research institutes and skilled labour). White paper Science and innovation 2009-2014 identifies health as a priority field. Bi-annual policy brief and innovation priorities is more specific. However this process step for developing S3 isn't explained in the case study	Competence mapping exercise (for accessing knowledge providers and potential impact of combined technologies) is a custom made tool for region self assessment	Society involvement (e users), through workshops; surveys Roadmap definition Own methodological assessment
Belgium , Flanders	Sustainable Chemistry FISCH (Flanders Innovation Hub for Sustainable Chemistry)	Growing capability of self-organization, allowed critical mass in joint and strategic projects Largest chemical cluster in Europe Turnover of € 40 billion(twice the European average) Several leading companies Longstanding investors	Sector yearly investments of €1 billion First industry-led innovation hub Clear specialization in chemistry still not supported for enough R&D system in this domain	Essencia Flanders (multi sector business federation of life sciences and chemical companies in Flanders) VITO (public research institute for environment, energy and materials)	FISCH is a prime mover Large industry Competence pole, high number of research institutes and universities Top economic sector Strong influential and international network (composed by the members of FISCH) Thus , Weak technological and scientific base (bellow average); lack of knowledge production and alignment, and low engagement in EU projects	Sustainable chemistry isn't clear defined in governmental policies Thus gets annual of € 2.6million for project financing Government acts as a process facilitator	FISCH applied to be recognized as a official SUSCHEM platform (the European platform for sustainable chemistry)	Case study only mentions Road mapping instrument to be used for project selection	Road mapping exercises for project pooling and selection FISCH used as a political instrument FISCH innovation agenda; feasibility study and business plan; Broad consultation and stakeholder involvement (allowed the creation of a shared strategic research agenda)	Surrounding E system analyses

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Czech Republic South Moravia	Regional Innovation Strategy (searching for Smart Specialization in a transitional economy)	IN C.R. there are 14 NUTs III, with their own government and innovation policy , most of them in "catching –up" phase, and copying strategies without real adaptation to region needs and capacity. Thus South Moravia, especially region capital Brno, with 500000 inhabitants is a leader in innovation support. Czech Republic, similar to other countries of Central Europe have a Foreign Direct Investments driven economy	Underdeveloped , thus growing sector of knowledge-intensive	Typical triple helix model approach	In south Moravia, manufacturing represents the main driver for competitiveness and Key industries are dominated by multinationals, which normally have not enough R&D operation. Local enterprises compete in standardized good and services market segments. S3 is fundamental for country/region development	Strong political support (dated from 2001, time when 1º RIS was framed from EU-founded project InterpRISe) Prime objective: streaming financial funds into the region	South Moravia future is about fundamental progress of the regional innovation policies. Thus they identify some Key industrial branches to pursue: Mechanical engineering, Electronics, ICT, and life-science	Based on extensive survey results and expert assessment by working groups leaders. Based on regional dialogue and capacities South Moravia selected 4 regional priorities for approaching S3: Technology transfer; Services for companies ; Human resources and Internationalization	JIC (first innovation centre)responsible for channeling EU structural funds into innovation support measures and pulling financial funds into the region	Case study makes no reference on how the region is monitoring results.
Estonian	Research and Innovation Strategies towards a knowledge based economy MER (ministry of education and Research) MEAC(ministry of economic affairs and communications)	Estonian small size, reflects directly in the small number of companies, lack of economics of scale or critical mass , sparse human resources , specially on knowledge intensive sectors . Thus size most not be a constrain but transformed into a competitive advantage, searching for more restrict and direct focus of specialized areas to approach	Lack of skilled human resources specially in science and engineering	Government	Estonian public expenditure are greatly dependent from European Structural funds, therefore there is a need for transforming RDI policy instruments regarding its flexibility and continuity, reducing the EU funding dependency. Estonian shall increase SME participation specially in R&D, and focus on fewer and stronger clusters	Government structure for R&D expenditures is totally dependent of EU structural funds. And It's notorious the lack of connections between the sector ministries, societal stakeholders and core RDI	Create measures for attractiveness of international competent skills. Continuing alignment of European priorities with national ones.	Priorities will be selected through a combine evaluation and analyses of Estonian structure economy (research and industry structure, country resources and world mega trends). In planning and designing the future strategies there will be the enrolment of MER; MEAC; University of tatu, Estonian development fund, other ministries, industry representatives, research institutes , enterprises among others.	Most important in creation of action plans and policy mix are recognizably the ministries MER and MEAC, which define programs for accomplish national RDI strategic objectives and align them with EU priorities .These programs are implemented through horizontal (generalist and broader based) and vertical approaches (focused on priority fields)	Such as Policy design, also the monitoring is made by MER and MEAC. This ministries have, at operational level, implemented intermediaries and agencies which conduct the monitoring of several RDI support measures and lead to future policies recommendation
Finland Lathi	From cluster strategy to Smart Specialization	Finland started in 2008 a synchronization process between national and regional innovation strategies focus on the aims of : Building a strong network knowledge base, renewing economy, creating new business , enhancing wellbeing in society and improving environmental sustainability. Lathi is an example of a region poor in research and development resources, hat could still show great proportion of innovativeness	Scarce R&D investment and R&D low level activity (region without universities)	Government Tekes	Concerning on finding the cross- cutting competences and industries that could create the most competitive value for a low level R&D activity region, the potential lies on the ability to renewal and use cross disciplinary competences and identify changes in lead markets. Practice based innovation	Government is committed in fostering smart specialization towards country development	Globalization as the main driver for change and increaser of competitiveness	Three thematic areas were chosen environment; design and practice based innovation	SFINNO project (rich database that allows versatile studies) Scarce on financing channels with risk taking capabilities Experimentation (practice based innovation philosophy) Conductive analyses 8 e.g: Tekes strategic area paper "People-Economy-Environment"	Case study makes no reference on this process step

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Germany Berlin and Brandenburg	Joint Innovation Strategy InnoBB (joint innovation strategy of the states of Berlin and Brandenburg)	Berlin and Brandenburg are the "Capital Region Berlin-Brandenburg" with 6 million inhabitants over 30000Km2. Together they created a joint innovation Strategy InnoBB	Strong Research organizations	Government Academia and Enterprises	Three years for analyzing and planning the implementation of joint innovation strategy and corresponding cluster structures. Berlin-Brandenburg are high international visibility and a very attractive place to live. within the clusters value chain is enhanced and gaps are filled	Government is active and foster of innovative companies	Enhancing international competitiveness . (Developing and coordinating joint and assisted cross borders projects)	Healthcare; Energy Technology; Transport, Mobility and Logistics; ICT, Media and Creative Industries; Optics, are the 5 selective priorities, after , Swot analyses and the results of 3 years innovation summit. Case study doesn't goes on further explanations thus is perceptible that a depth analyses have occurred.	Funding Schemes; extensive services provide by the clusters organizations ;venture capital funds for young innovative companies, examples of a joint governance on innovation strategy carried out by InnoBB	Each of the 5 clusters of InnoB has to define indicators that wi allow the progres evaluation. Cooperation between clusters will be monitor b a common pilot project and throu cross-cutting themes
Korea, Gwangju	Photonics cluster	Photonics came as economic salvation after 1997 crisis. The industry employs 8270 persons within its 377 enterprises, with a crescent annual growth rate Past strategy is responsible for today Triple helix model (strong interaction between academia, government and industry)	Government is fostering a Knowledge society, based on a very specific specialization like photonics. We can state R&D is in place, but Korea still as increase competitiveness and a strengthen bottom-up process of discovery in a bustling global world	4 local universities 9 local research institutes 7 public services agencies	Lack of future core industries Need for Multi-level coordination and stakeholders mobilization Local network that provides business incubation, R&T development, technology transfer, pilot production, equipment services, management, marketing and human resources	Strong policy intervention for attracting universities and research institutes to photonics industry Government acts a decisive role in prioritization industrial domain, creating policies advantages and funding. Active engagement with innovation system	Grasping opportunities for smart specialization. Vision for 2020 is to develop photonics R&D cluster; attract Korean large companies; boost SME and strengthen supply chain to increase demand and internationalize R&D cooperation	Case study as no reference on selection fields towards S3	In order to accomplish 2020 vision, region will focus on fusion technologies, and strategies that promote next generation innovation and enhance global standard leadership, intensify business services. Enhancing region advantages like strong engineering capabilities and diverse engineering networks.	Case study makes no reference to monitor instruments used the evaluation of Korea photonics attempt of smart specialization
Netherlands, Brainport Eindhoven	Industrial Top technology (Curiosity: Brain-port, Sea-port, Air-port)	Population of 740.000, GRP of 27 billion; Brainport Eindhoven is the high-tech heart of Netherlands, one of the three key pillars of Dutch economy and accounts for the 40% of Dutch business spending in R&D. One of high performing high-tech clusters in Europe Strong export orientation towards high value added niche and strong global value Chain SME proximity Awarded in 2011 'world most intelligent community'	High R&D over €2.5 billion, 80% of which is private investment; High knowledge intensity ; highest patent density in Europe;	Quadruple -helix: Entrepreneurs Industry Knowledge institutes and government Civil society	Collaborative Triple helix model Strong technology and design base Strong position in KETs (like nano-electronics, photonics, advanced materials and manufacturing systems) Key focal sectors are high-Tec systems and materials, automotive, life-Tech &health, food &technology and design Main markets are health; life-Tec; food; energy; smart mobility; logistics and security Brainport stands out on international connectedness , collaboration and entrepreneurship Business driven innovation system	Government is a stimulator, co-coordinator, funder of R&D public expenditure and public infrastructure. R&D&I governance model is characterized by a successful public-private partnerships, strong knowledge institutes involvement, open innovation, multidisciplinary technology domains, low barriers high trust Multi-level governance cooperation	Brainport 2020 Top economy and smart society. Be in the top 3 technology regions in Europe and in the top 10 worldwide by 2020 Strengthen cross border links with Flanders and Nordrhein-Westfalen Increase public investment in the region Recognizable as smart specialized region	Case study refers that Brainport identifies 3 top clusters, the need for diversification, and its importance for developing a strategy, but as no reference on how the selection fields were made.	WBSCO scheme for corporate tax deduction and R&D expenditures; other specific policy instruments to foster innovation , competitiveness, funding (credit and venture capital) Subsidy instruments are almost inexistent Cross border collaboration can be a solution for easing scaling up and increasing talent and skilled labour; Partnerships	Annual monitorin in the 'Brainport monitor' that covers 40 statistic indicators, trend analysis, benchmarking, several comparis schemes, 30 reports with qualitative and quantitative on region relevant topics . Maturity comes after 7 to 10 year

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Poland Malopolska	Priority setting and governance for Smart Specialization	Malopolska undergone many changes , concerning governance and economic structure. The case study shoes the relevance of universities in supportiveness and transformation of a transitional regional economy	Medium Tec manufacturing and knowledge-based services	Government Universities Engagement of civil society	Malopolska region wants to engage civil society in the process of preparing the region to the Ris 2013-2020. They established a diverse expert group (science; business and government), for better alignment with EU structural funds and regional strengths and capabilities .Monitoring and evaluation systems are deeply taken into account	Decentralized governance structure, seen as multi-level governance system	Foster the regional innovation system , (concentrate on public funding; support entrepreneurship and education; incentivize bottom up initiatives)	Case study refers that priorities were chosen by the implementation of foresight programs, thus it doesn't explains how the selection process take place	Key policy instruments referred on case study are: Malopolska Regional Operational Programme 2007-2013 (EU cohesion Funds 2007-2013) and Special Economic Zone in Krakow (SEZ), managed by Technological Park Krakow	4 Regional Development Observatories are the main responsible organs for monitoring the impacts and results of implemented regional innovation policies. Monitoring process are taken in account when preparing for strategic regional documents
Spain, Andalusia	Aerospace cluster	Andalusia is the home of the Aerospace cluster, formed by 120 enterprises (SME and non SMES), that employs 11000 people and generates €2 billion, meaning 35% of the GDP of the region. The cluster exports over 70% of its turnover	Innovation system evolved through the form of Innovation infrastructure	Knowledge agents Public and private Technological centers and scientific & technological Parks Research and Technological institutes SMEs Government	Relevant International Linkages The cluster companies are a part of the Europe supply chain, and have strong connection with Brazil, Canada and USA Andalusia has an enormous competitive advantage in Aerospace industry , created by all knowledge achievements from a past with almost 100 years of history Multi-level governance are policies aligned. The governance horizontal approach leaves a gap in the connection with industries and entrepreneurial process of discovery	Regional funds Financial lines available Regional priorities are aligned with national and European strategies, thus there is a lack of cooperation and alignment with industry in common strategies Need to consider entrepreneurial process of discovery	"Turn the Andalusian Aerospace into a competitive sector of Knowledge & innovation based economy and in one of the engines of development"	We can refer that priorities choices , or selected fields were based on Andalusia historical past in Aerospace, thus the case study doesn't explain procedures towards the chosen fields	Andalusia Plan For Research Development and Innovation (PAIDI) Hélice Foundation, provides advice to regional administration updating its priorities and strategic lines of action. The foundation has created "The Strategic Plan", that is aligned with Andalusia Plan for Industrial Development, which pin points strategic sectors and is use by the regional administration, entrepreneurial associations and Trade Unions.	The Strategic Plan enrolls and aligns 22 concrete measures with indicators that allows self evaluation. The Helice Foundation, as an active role in promotion and participating in initiatives and disclosure relevant knowledge. Also it "monitors" through conductive surveys studies that identifies the cluster capacities and potential project opportunities
Spain, Basque country	Smart Specialization Strategy (Public Governance centralization (clear leadership) structure, that needs to be aligned with Provincial councils and university of B.C., that also have a clear autonomy level)	Basque country is an autonomous community with autonomous structure.	Increasing R&D structure	Government (Public and private entities)	Strategic Analyses starts with PCTI plan following global market trends (Aging; Energy; Transport and Mobility; Digital World; Science Industry) and regional capabilities (Biosciences; Nano-sciences and Advanced Manufacturing	PCTi aims at implementing a multi –level governance (shared leadership of public governance with main institutions of B.C.)	Government aimed reaching at 3% of GDP in R&D by 2015	Case study states that PCTi, 2015 is based on a careful diagnosis of B.C. System of science , Technology and innovation, ending with Swot analysis, and this aloud the chosen of the stated strategic goals.	Regional strategic planning tools; sectoral strategic plans (private and public); Strategies from Technological centers ,Universities; cross-cutting strategies; operational programs; funding Business R&D; public funding; tax policy; among others	PCTi (Plan science Technology and innovation), uses 25 different Performance indicators within different methodologies covering different for monitoring and measuring policy impacts

(…)

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Turkey, East Marmara	Automotive Cluster	East Marmara produces 98% of 1.6million vehicles constructed in Turkey and the sector employs 45000 people Favorable geographic condition near European market , and most important domestic market Well educated labour work force Important related variety, composed by 22 original equipment manufacturer and 1100 suppliers companies. The cluster as 2 free zones; 3 techno parks over 25 organized industrial zone s(OIZ)	Scientific and technological infrastructures High innovation capacity and Strategic intelligence	Government Industry	Automotive sector is the economic leader in terms of exportation and R&D capabilities in Turkey . Diversified network; Notable Past experience which comprises more than 50 years of history	Funding programmes (TUBITAK) Strong supportive political commitment namely through the following instruments: (UBTYS), national Science, technology and Innovation strategy; Industrial Strategy and Action Plan for Automotive Sector; Ninth Development Plan , report of Automotive sector	Reducing importation in strategic sectors; Flexible and R&D based Export strategy structure Refining the whole chain supply	Case study makes no reference on how or why the region chosen automotive sector or three other sector considered to be strategic ones.	SCST (supreme council for science and technology) is the highest policy maker body in turkey , that guides and frames policy intervention	Case study makes no reference on how monitoring of S3 is made, although its implicit that SCST, must comprise and regulate that activity
UK	Automotive Industry	Automotive sector represents 12% of total exportation, summing £10billion of GBP and providing 135000 direct jobs. Uk is one of the most diverse and productive vehicle manufacturing and global centre of excellence for engine development and production in Europe	Intensive R&D strategy with spending over £1.5 billion annually	Government Industry Academia	Transition towards a low carbon future Strong foreign direct investment Dynamic supply chain, with many world's big component manufactures within 2400 in total. Uk is increasing its force in power train design and production The sector is flexible, responsiveness, with skilled and motivated work force, recognisable internationally	Government is a facilitator and a supportive strategist, which committed hundreds of millions towards the development of ultra-low carbon vehicles in UK	Make UK the leading place in the world to develop, demonstrate and manufacture ultra-low carbon vehicles Maximize the benefits of sector operating firms and supply chains. Continue foreign investment attraction	UK gets the best of its position as a high quality and powerful Automotive manufacture and explores the same activity towards an aligned European strategy for a Low-carbon economy (sustainable economy) The NAIGT, produced a composed document , with determinant analyses, culminating in a dynamic scorecard that covers 30 technologies across 8 areas ,that allowed to conclude (with help from other instruments like a Technology group) that a low carbon is the specialized strategy to follow	The New Automotive Innovation and Growth team (NAIGT), compiled a report planning for low carbon future and technological Roadmap until 2050, a Common Research Agenda, to map technology demands and R&D needs Technology group facilitates the creation of short-term objectives for technology developments towards the product Road map	The case study doesn't specify what instruments are being used in monitoring the strategy

Appendix C

Article Title	Topic	Type	Unit of analysis	Countries (sigla)
Foresight methods for smart specialization strategy development in Lithuania	Policy approach through innovation	Theoretical/Appreciative	Country	LT
What is smart rural development?	Policy approach to innovation	Theoretical		EU
Diversity of theoretical approaches to the concept of smart city	Other	Theoretical /conceptual		EU
Engaging students in learning EU terminology Through Translation	Other	Appreciative (comparison study Ro-EU)	Country	RO
Smart specialization and global competitiveness: Multinational enterprises and location-specific assets in Cape Town	Regions/countries economic development	Empirical	Regions Cape town	Z.A
Smart specialization concept and the status of its implementation in Romania	Regions/countries economic development	Empirical	Country	RO
The role of natural resources and the social capital in EU's growth Strategy - Europe 2020	Europe 2020 Strategy	Theoretical		EU
Smart workforce structures versus regional development in European union countries of new accession (EU12)	Regions/countries innovation policies	Theoretical		EU
Impact of clusters on university-industry interaction	Other	Theoretical	(clusters)	
A study on galvanizing of Start-ups atmosphere based on Smart specialization and the entrepreneurial university - Technion institute of Technology, Hebrew University-	Regions/countries economic development	Theoretical		IL
Innovation performance of Chez Regions	Regions/countries innovation policies	Appreciative	Chez Regions	CZ
Smart Development: A Conceptual Framework	Conceptual	Conceptual		
Creative Industries and Creative Index: Towards Measuring the "Creative" Regional Performance	Region/countries innovation policies	Appreciative	Chez Regions	CZ
Possibilities of development of international collaboration of the sloval small and medium enterprizes in research, development and innovations	Region/countries innovation policies	Empirical		SK
Integration of Knowledge Management into Business Process	Regions/countries economic development	Theoretical		
The Process of Regional Smart Specializations Identification in Poland - the Case of Lublin Voivodeship	Regions/countries innovation policies	Empirical	Region Lublin voivodeship	PL
Bioeconomy regional strategy toolkit the berst project	Regions/countries economic development	Theoretical		
Towards a green star thermo refinery: assessment and upgrading of regional biomass feedstocks	Policy approach through innovation	Empirical		
Knowledge Economy and Regional Innovation Policy Milieu	Regions/countries innovation policies	Theoretical	(Policy milieu)	
Place-Based Approach: a US-EU Comparison	Regions/countries economic development	Empirical		US_EU

Article Title	Topic	Type	Unit of analysis	Countries (sigla)
Competitiveness clusters - Paradigm for economic development of the republic of croatia	Regions/countries economic development	Empirical	Country	HR
X-ray techniques for innovation in industry	Regions/countries innovation policies	Theoretical		
Smart Specialisation: Opportunities and Challenges for Regional Innovation Policy	Regions/countries innovation policies	Book		
Towards a new era for regional development: Investing in leadership	Policy approach through innovation	Appreciative	Regions	
Innovating ICT innovation: Trentino as a lab	Policy approach through innovation / open innovation/	Empirical	Region Autonomos province of TRENTO	IT
Industrial change and EU programmes in creating a favorable environment	Regions/countries innovation policies	Appreciative		EU
Paradigm change in regional policy: Towards smart specialisation? Lessons from Flanders (Belgium)	Regions/countries innovation policies	Empirical	Region Flanders	BE
Smart specialization strategies: A territorial strategy for regions [Las estrategias de especialización inteligente: Una estrategia territorial para las regiones]	Regions/countries innovation policies	Theoretical	Regions	
Intelligent specialization of regions as an instrument to support innovation	Policy approach through innovation	Conceptual	Regions	
Regional innovation patterns and the eu regional policy reform: Toward smart innovation policies	Regions/countries innovation policies	Theoretical		EU
Modern regional innovation policy	Regions/countries innovation policies	Empirical /theoretical		
Smart Specialization, Regional Growth and Applications to European Union Cohesion Policy	Conceptual	Conceptual		EU
Targeting biomed cluster from a mature pharma industry: The Medicon Valley experience	Policy approach through innovation	Empirical		
Prospects for 'place-based' industrial policy in England: The role of Local Enterprise Partnerships	Regions/countries innovation policies	Empirical	Regions (local enterprises)	GB
Prescription for Poland: Disruptive innovative e-Health ecosystem for regenerative medicine in Poland	Europe 2020 Strategy	Empirical	Country	PL
Discussing development alternatives for the city of Madrid on the horizon Europe 2020: Challenges and threats from the perspective of knowledge workers [Discutiendo alternativas de desarrollo para la ciudad de Madrid en el horizonte Europa 2020: Retos y amenazas desde la perspectiva de los trabajadores del conocimiento]	Europe 2020 strategy	Appreciative	Region of Madrid	ES
Intelligent piggybacking: A foresight policy tool for small catching-up economies	Policy approach through innovation / open innovation	Theoretical	Country	EE
Transforming European regional policy: A results-driven agenda and smart specialization	Conceptual	Conceptual		EU

Article Title	Topic	Type	Unit of analysis	Countries (sigla)
The dimension of smart specialisation in the business system	Regions/countries innovation policies	Conceptual		
Development without a metropolis: Inspiration for non-metropolitan support practices from Denmark	Regions/countries economic development	Empirical	Country	DK
Open innovation network and implications for specialisation of a small urban area	Policy approach through innovation / open innovation/	Theoretical		
A territorial taxonomy of innovative regions and the European regional policy reform: Smart innovation policies [Una tassonomia delle regioni innovative e la riforma della politica regionale Europea: Politiche di innovazione intelligenti]	Regions/countries innovation policies	Theoretical		EU
Place-based economic development strategy in England: Filling the missing space	Regions/countries economic development	Appreciative	country	GB
Planning local economic development in the emerging world order	Regions/countries economic development	Appreciative		UK-US
A holistic approach to regional strategies: The case of the Basque Country	Other	Holistic	Region País Vasco	ES
Path dependence in policies supporting smart specialisation strategies: Insights from the Basque case	Policy approach through innovation / Path dependency	Conceptual/Appreciative	Region País Vasco	ES
Designing and implementing a smart specialisation strategy at regional level: Some open questions [Progettazione e implementazione della strategia regionale di specializzazione intelligente: Alcune questioni aperte]	Policy approach through innovation / RIS3	Appreciative	Regions	
Smart specialisation strategy and the new EU cohesion policy reform: Introductory remarks [La strategia di specializzazione intelligente e la riforma della politica di coesione europea: Alcune note introduttive]	Policy approach through innovation	Appreciative		EU
How to boost innovation from public administration [Cómo impulsar la innovación desde la Administración Publica]	Regions/countries innovation policies	Theoretical	Cities	
Cross-mapping of regional research and production landscapes: Methodological issues and implications for elaborating regional innovation strategies	Policy approach through innovation	Empirical		
The innovation ecosystem as booster for the innovative entrepreneurship in the smart specialisation strategy	Policy approach through innovation	Appreciative		
The centrality of entrepreneurial discovery in building and implementing a smart specialisation strategy [La centralità della scoperta imprenditoriale nella creazione e implementazione della strategia di specializzazione intelligente]	Policy approach through innovation	Appreciative		
The Quadruple/Quintuple Innovation Helixes and Smart Specialisation Strategies for Sustainable and Inclusive Growth in Europe and Beyond	Regions/countries innovation policies	Theoretical		EU
Constructing regional advantage and smart specialisation: Comparison of two European policy concepts [Vantaggi regionali e specializzazione intelligente: Due concetti di policy Europea a confronto]	Policy approach through innovation (SSversusCRA)	Appreciative		EU

Article Title	Topic	Type	Unit of analysis	Countries (sigla)
The role of the smart specialisation agenda in a reformed EU Cohesion Policy [La strategia della specializzazione intelligente nella riforma delle politiche di coesione dell'Unione Europea]	Conceptual	Conceptual	Regions	EU
Smart growth, smart specialisations strategies and impact of the technological districts: The moderating effect of business, geographical and institutional factors	Regions/countries innovation policies	Appreciative		
Adapting smart specialisation to a micro-economy – the case of Malta	Regions/countries innovation policies	Empirical	Country	MT
Smart specialisations for voivodeships - The first steps toward improvement?	Regions/countries innovation policies	Appreciative	Region Voivodeship	PL
Smart specialisation in the tangled web of European inter-regional trade	Policy approach through innovation / RIS3	Empirical	Inter-regional	EU
Guest editorial on research and innovation strategies for smart specialisation in Europe: Theory and practice of new innovation policy approaches	Policy approach through innovation / RIS3	Appreciative/ Conceptual		EU
Is eco-innovation a smart specialization strategy for andalusia? One approach from the multivariate analysis [¿Es la eco-innovación una estrategia inteligente de especialización para Anda-lucía? Una aproximación desde el análi-sis multivariante]	Regions/countries innovation policies	Theoretical	Region Andaluzia	ES
Smart specialisation strategies in south Europe during crisis	Policy approach through innovation / RIS3	Empirical / Conceptual	South Europe	EU
Smart specialisation in European regions: Issues of strategy, institutions and implementation	Regions/countries innovation policies	Empirical / Appreciative		EU
From smart specialisation to smart experimentation Building a new theoretical framework for regional policy of the European Union	Conceptual (theory over a new concept definition of SS)	Theoretical		EU
From smart specialisation to smart specialisation policy	Conceptual	Conceptual		
Specialization and diversity as drivers of economic growth: Evidence from High-Tech industries	Regions/countries economic development	Appreciative		
Research Driven Clusters at the Heart of (Trans-)Regional Learning and Priority-Setting Processes: The Case of a Smart Specialisation Strategy of a German ""Spitzen"" Cluster	Policy approach through innovation	Empirical	Regions of Germany (clusters)	DE
Related Variety and Regional Economic Growth in a Cross-Section of European Urban Regions	Regions/countries economic development (related variety)	Conceptual	European urban regions	EU
Industrial preconditions for smart specialization of Lithuania regions [Sumanios Lietuvos regionų specializacijos industriės prielaidos]	Regions/countries economic development	Conceptual/appreciative	Regions of Lithuania	LT
Efforts to Implement Smart Specialization in Practice—Leading Unlike Horses to the Water	Europe 2020 strategy	Empirical	Southern EU	EU
An empirical test of the regional innovation paradox: can smart specialisation overcome the paradox in Central and Eastern Europe?	Regions/countries innovation policies	Empirical	Central and Eastern Europe	EU
Economic development and evolving state capacities in Central and Eastern Europe: can "smart specialization" make a difference?	Regions/countries innovation policies	Appreciative	Central and Eastern Europe	EU