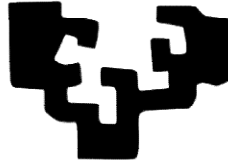


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DEPARTMENT OF FINANCIAL ECONOMICS

**Master in**

***BUSINESS MANAGEMENT FROM AN INNOVATION  
AND INTERNATIONALISATION PERSPECTIVE***

A comparative assessment of Smart Specialisation Strategies:  
the RIS3s of The Basque Country,  
Extremadura and Emilia Romagna

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## **Abstract (English)**

Today we are in the middle of the eight European programming period 2014-2020, where the Smart Specialisation Strategy has assumed a central role for the effective realisation and achievement of the European Cohesion Policy, and it is considered as the main driver to foster and support innovation among European regions. Nevertheless, development strategies are difficult to be assessed, since the complexity of the context in which they operate. The success or failure of these types of strategies may depend on the quality with which they are elaborated, hence different level of Smart Specialisation's designs might lead to different outcomes. Therefore, it is important to provide an effective evaluation system which can furnish answers about how regions have developed their own RIS3s.

The aim of this work is to further test the S3 threefold assessment method that a colleague of mine called Filippo Damiani and I have elaborated for our Master's degree in Languages for Communication in International Enterprises and Organisations in the university of Modena and Reggio Emilia.

The objective of this method is to assess the quality and completeness of Smart Specialisation Strategies elaborated by European regions, in order to assist policymakers when they come up to the monitoring and evaluation phase of S3 and to help them to draw up conclusions about the effectiveness of S3 to achieve the goals regions have set.

The method is composed by three different phases. The first one assigns a quantitative judgement on the quality and completeness of the S3s. This task will be accomplished by using the Assessment Wheel 2.0, which is the enhancement of the Assessment developed by Christian Saublens, executive director of EURADA, which was conceived "for the synthetic representation of the progress made in drafting/designing a RIS3" ('Assessment Wheel - Smart Specialisation Platform', 2018), used especially by regions during their peer-review workshops.

The second phase aims to compare this quantitative judgment with respect to strategies developed by other regions. Therefore, for this step the standard deviation is used in order consider, as a relevant facet in the strategy, not only the single values of marks of the first phase, but also the composition of the overall judgment with respect to the steps that compose it.

The third phase aims to assign a final qualitative judgement to the overall strategy and measure the grade of probability that the strategy can achieve the expected goals. To do this and to make a sort of foresight about the possible outcome the S3 may bring to regions, the fuzzy logic will be used by utilizing the Fuzzy-Lite controller program.

The threefold method will be applied to three strategies developed by three different European regions, in the specific the Spanish regions of The Basque Country and Extremadura, and the strategy of the Italian region of Emilia Romagna. The intention is to understand whether strategies realized by developed regions are better designed with respect to lagging regions, since the latter might not have the same capability and knowledge to design their own strategies. Moreover, it is also remarkable to assess whether regions that have structural similarities but belong to different contexts might have differences in the quality of their strategies.

## **Abstract (Spanish)**

Actualmente, nos encontramos en medio del octavo período de programación Europeo (2014-2020), en el cual la Estrategia de Especialización Inteligente ha tomado un rol central para la puesta en marcha de manera efectiva de la Política de Cohesión, considerada como una política clave para fomentar y fortalecer la innovación entre las regiones Europeas. Sin embargo, las estrategias de desarrollo son de difícil evaluación, dada la complejidad del entorno en las cuales operan. El éxito o el fracaso de dichas estrategias puede depender de factores endógenos y exógenos, pero también de la calidad con las que son elaboradas, por tanto, la diferente calidad del proyecto de la Especialización Inteligente, puede afectar a su éxito. Por esta razón, es necesario proveer un sistema de evaluación eficaz, que pueda dar respuestas acerca de cómo las regiones han elaborado sus estrategias.

El objetivo de este trabajo es examinar en profundidad el triple método de evaluación de la S3, el cual hemos elaborado un compañero de la universidad y yo durante la realización del Master en Idiomas para la Comunicación en Empresas y Organizaciones Internacionales en la Universidad de Módena y Reggio Emilia.

La finalidad de esta metodología es evaluar la calidad y la completitud de las Estrategias de Especialización Inteligente elaboradas por las regiones Europeas, para asistir a los legisladores de las mismas en lugar de la fase de seguimiento y evaluación. Así como ayudarles también en la elaboración de conclusiones acerca de la eficacia de la S3 en lograr los objetivos establecidos para la región.

El método está compuesto por tres fases diferentes. En primer lugar, es necesario asignar un juicio cuantitativo sobre la calidad y la exhaustividad de las estrategias, según las pautas. Para hacer eso, utilizaremos el Assessment Wheel 2.0, que es la recreación del Assessment Wheel, elaborada por Christian Saublens, director ejecutivo de EURADA, el cual fue concebido para la representación sintética del estado de avance del diseño de la S3 durante los talleres de Peer-review de las regiones.

En segundo lugar, es necesario comparar este juicio cuantitativo con las estrategias realizadas por otras regiones. Por esta razón, en esta fase se utilizará la desviación estándar para tener en cuenta como elemento importante, los juicios cuantitativos y la composición de los mismos, considerando también sus grado de dispersión.

En tercer lugar, es apropiado realizar una evaluación cualitativa final de toda la estrategia, así como medir el grado de probabilidad de que ésta pueda alcanzar los objetivos establecidos por la región. Para cumplir con este objetivo, se usará la lógica borrosa, realizando una especie de previsión acerca de los posibles resultados que la S3 puede aportar a las regiones. En concreto se utilizará el programa de control borroso Fuzzy-Lite.

Esta metodología se aplicará a tres estrategias desarrolladas por tres regiones diferentes: dos de ellas españolas, el País Vasco y Extremadura, y una italiana, Emilia Romagna. El objetivo de este trabajo es comprobar si las estrategias creadas por las regiones desarrolladas están mejor diseñadas con respecto a las regiones subdesarrolladas, ya que estas últimas podrían no tener la misma capacidad y conocimiento para diseñarlas. Además, es destacable evaluar si las regiones que tienen similitudes estructurales pero que pertenecen a contextos diferentes pueden tener diferencias en la calidad de sus estrategias.



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## Disclaimer

This work aims to make a comparative assessment of three regional Smart Specialisation Strategies designed by three European regions, in the specific the RIS3s of The Basque Country, Extremadura and Emilia Romagna. However, the strategies entail differences with respect to the data, sources and documents which they are composed by. Hence, in order to perform a meaningful assessment, all the external documents that are cited and presented within the strategy should be considered in the analysis. This because the aim of the assessment is not only to analyze single strategies, but also verify whether regions effectively monitor and know themselves. However, for a matter of uniformity, fairness and time, the analysis will be carried out only considering the single strategies downloaded from the S3 Platform and the external documents that are strictly related to them, such as complementary material for the presentation of the priority areas. Regarding the RIS3 of The Basque Country, the only external documents which will be taken into consideration are: the “Estrategia RIS3 de Euskadi” mentioned at page 47 of PCTI Euskadi 2020, which identifies and explains in detail the priority areas of the strategy and the “PTCI Euskadi 2020 – Instrumentos del Policy mix”, which provides an in-depth description about the instruments of the policy mix.

Extremadura instead develops a strategy by mentioning several references. Nevertheless, none of them is explicitly cited as complementary document for the strategy, therefore, the single RIS3 will be only taken into consideration. In addition, the strategy indicates in the index three annexes which complement the overall strategy’s design and contain important information to be included in the analysis, such as the agents identified and the digital agenda. By the way they are not physically present in the document, thus they will not be assessed.

Finally, Emilia Romagna does not mention any reference, thus, the only external citation which will be considered is the [emiliaromagnastartup](#) portal, that describes the start-ups and incubators in the region. Nevertheless, for respect of other strategies that have provided the information on paper, the website will be considered as a relevant source for step one only.





## **Introduction**

Smart Specialisation Strategy can be defined as the core of the broader Europe 2020 Strategy, aimed at enhancing Europe's capacity of delivering smart, sustainable and inclusive growth. In order to face the current challenges of the global economy, the Smart Specialisation Strategy is seen as the main driver to achieve these goals. European regions are called to design and implement their own S3 strategies in order to fulfil the ex-ante conditionality required by the ESI Funds. Therefore, the European Commission has made available a guide called 'RIS3 Guide' in order to underpin regions in this task. However, not all regions have the same capability in the RIS3 design, therefore the under-developed regions might not have all of the knowledge, instruments, background and experience to analyse themselves, their regional assets and their competitive advantages, with respect to the more developed ones. For this reason, it is important to assess how regions have made their RIS3s.

In my previous work called "Assessing Smart Specialisation Strategies: a threefold method applied to The Basque Country's RIS3" (Ferrarini, 2018) a colleague of mine called Filippo Damiani and I have created a threefold method which aims to assess the quality with which RIS3s have been elaborated by regions, in order to analyze ex-post how they have designed them. This is useful because it is worthwhile to understand whether goals regions are targeting will not be fully accomplished even due to a poor RIS3 design: "What is clear is that smart specialisation should be measured in time on whether or not it has prompted and helped regions to take a more strategic and engaged approach to their economic development."(Aranguren, Morgan, & Wilson, 2016)

The first part of the method was conceived by following two main sources: the RIS3 Guide and the Online S3 platform, because they are the two main guidelines to assist policymakers in the S3 design. Thus, they have been taken as references in order to create the main tool that makes possible the assessment, the so-called Assessment Wheel 2.0, which is the enhancement of the Assessment Wheel developed by Christian Saublens, executive director of EURADA, instrument which is issued by the European Commission and available in the S3 platform. This allows to assign a quantitative judgement to the quality of the strategy analyzed, by giving a mark to each of the single eighteen priority areas that compose the six steps whose strategies are formed by, according with the indications of the RIS3 Guide.

The second part of the method consists in the application to the results obtained from the Assessment Wheel 2.0 of the standard deviation. The latter allows to compare the quantitative judgments of the Assessment Wheel 2.0 related to one strategy, with respect to the judgements of the strategies developed by other regions. This because is not only important to consider the single values of marks given, but also the their composition. This permits to consider as important indicator for the quality of a strategy its uniformity and the grade of dispersion of marks.

The third part consists in the insertion of the marks obtained from the Assessment Wheel 2.0 in a fuzzy logic program, in particular the Fuzzy Lite controller. The fuzzy logic not only gives an overall final qualitative judgement to the strategy, by transforming the quantitative judgements to a single qualitative one, but also measures the grade of probability that the strategy can achieve the expected goals, by displaying an output measurement.

However, so far it was not possible to test the stability and consistence of the method. Hence, in order to further check the adequacy of the system it is important to apply it to more regions. Moreover, due to fact that is possible that regions with different level of development do not have the same capability and knowledge to design their strategies, it is worthwhile to compare strategies of developed regions with strategies of lagging regions. In addition, due to the fact that the European Union is composed by regions belonging to different contexts, it is also remarkable to compare strategies which are designed by regions that belong to different economic environments but with structural similarities.

Therefore, the strategies that have been selected for the comparison with the strategy of The Basque Country are those of Emilia Romagna region in Italy and Extremadura region in Spain. The first has been chosen by using the Regional Benchmarking tool of the S3 platform, which finds reference regions based on structural similarities by giving a distance index. The most similar foreign region to The Basque Country was the region of Emilia Romagna.

Extremadura instead has been chosen because it is the only less developed region in Spain. Thus, it is worthwhile to investigate whether there are differences in the S3 design between more developed regions, whom Basque Country belongs, and less developed ones.

This dissertation is composed by five chapters. In the first chapter a brief introduction about the Smart Specialisation and the context in which it operates will be outlined. Furthermore, space will

be left to the description and explanation of the threefold assessment method, by considering and illustrating the methodology, the framework, the different tools that compose it, and the sources such as the RIS3 Guide and the Online S3.

The second, the third and the fourth chapters are devoted to the description and assessment of the single strategies, by also considering the regional priorities. The strategy of The Basque Country will be described in the second chapter, while the strategy of Extremadura in the third. Finally the strategy of Emilia Romagna will be explained in the fourth chapter.

In the fifth all strategies will be compared. This is the most important chapter, because when strategies will be put in relation together it will be possible to verify whether there are differences in the quality of them. Thus, it will be possible to draw up conclusions by confirming or disconfirming what mentioned above, namely, regions that have different levels of development or belong to different contexts, have a different grade of capability to design their own strategies.

Regarding the references, in order to make a distinction between extended quotations of official documents statements and classical citations not longer than 40 words, it has been decided to create a specific font regarding the formers.

This follow-up work has been made possible thanks to the attended lessons in the university of The Basque Country during the Master in “Business Management from an Innovation and Internationalization Perspective”, where most of the tools and topics developed in this dissertation have been taught. In particular, the Smart Specialisation concept, which was introduced to me from Professor Jon Barrutia during his classes in Innovation Management in SME’s and the fuzzy logic, which was taught to me from Professor Jiménez Lopèz Mariano during his classes on the Fuzzy-Lite program. Hence, I must to say thanks to these persons to have made possible this work to me.

# Chapter 1 - The Smart Specialisation concept and the assessment method

Key Words: Smart Specialisation, RIS3, Europe 2020, Assessment, Threefold method Assessment Wheel 2.0, Standard deviation, Fuzzy logic

Smart Specialisation was born out of the financial crisis of 2008, as an attempt to give answers to the economic challenges faced by Europe in order to stimulate growth and innovation.

In November 2009 the European Commission published a document called “Knowledge for Growth” as the product of a Knowledge for Growth experts group working to find an alternative to public policies that could enhance and spread investment in technology, research and education and also support to businesses and R&D. The purpose was to encourage regional governments to invest in domains intended to create future capabilities and interregional comparative advantages. (OECD Publications, 2013- Innovation-driven Growth in Regions: The Role of Smart Specialisation, page 11)

This strategic proposal was coined “Smart Specialisation”, which preliminary concept was conceived by Dominique Foray, Paul A. David and Brown Hall in their article *Smart Specialisation – The Concept*. Their idea was to encourage investments in programs that would have complemented the country’s productive asset to create future domestic capability and interregional comparative advantages through the so called “*Entrepreneurial Discovery Process*” (EDP), as a way to discover “what a country or region does best in terms of science and technology.” (David, Foray, & Hall, 2009)

## 1.1 The context of the Smart Specialisation

The Smart Specialisation, also called RIS3 or S3, has been conceived within the two main pillars of the 2014-2020 programming period, which are the Europe 2020 strategy and the Cohesion Policy.

The Europe 2020 strategy was conceived as answer to the mixed result of the previous Lisbon strategy (2000-2010). It has been designed to be the main driver for growth enhancement in Europe, consisting in a series of goals and objectives targeting employment, R&D, climate and energy, education, social inclusion and poverty reduction.

**Figure 1.1– Europe 2020 Targets and Objectives**



Source: “Europe 2020 - From Indicators and Targets to performance and Delivery”, page 3

Figure 1.1 shows the five objectives which are the aims of the Europe 2020 strategy. They are part of three main priorities, called Flagships Initiatives, which are the hearts of the overall strategy: smart growth, sustainable growth and inclusive growth.

Smart growth aims to develop an economy “based on knowledge and innovation.”(European Commission, 2010a) Therefore, it is composed by Digital agenda for Europe, “to speed up the roll-out of high-speed internet” (European Commission, 2010a) the Innovation Union, “to improve access to finance for research and innovation;” (European Commission, 2010a) Youth on the Move, “to facilitate the entry of young people to the labour market.” (European Commission, 2010a)

Sustainable growth aims to “promote a more resource efficient, greener and more competitive economy.” (European Commission, 2010a) Thus, it is composed by Resource efficient Europe, “to

support the shift towards a low carbon economy;” (European Commission, 2010a) and an Industrial policy for the globalization era, “to improve the business environment for SMEs.” (European Commission, 2010a)

Inclusive growth aims to “foster a high-employment economy.” (European Commission, 2010a) Hence, it is composed by an Agenda for new skills and jobs, “to modernise labour markets and empower people” (European Commission, 2010a) and the European platform against poverty, “to ensure social and territorial cohesion.” (European Commission, 2010a)

The Cohesion Policy instead was launched in order to achieve the objectives of Europe 2020 strategy. It consists in an investment framework strategy that “targets all regions and cities in the European Union, whose aim is to support job creation, business competitiveness, economic growth, sustainable development and improve citizen’s quality of life.” (European Commission, 2014)

The financing drivers of Cohesion Policy are the so called ESI funds, which provide financial support to states and regions to reach the social and territorial cohesion in Europe. These five ESI Funds are:

- the European Regional and Development Fund (ERDF)
- the European Social Fund (ESF)
- the Cohesion Fund
- the European Agricultural Fund for Rural Development (EAFRD)
- the European Maritime and Fisheries Fund (EMFF)

ERDF which relies on regulation 1301/2013, “aims to reinforce economic, social and territorial cohesion by investing in growth-enhancing sectors to improve competitiveness and create jobs.” (European Commission, 2015a) ESF, which relies on regulation 1304/2013, aims to “invests in people with a focus on improving employment and education opportunities.” (European Commission, 2015a) The Cohesion Fund, which relies on regulation 1300/2013, aims “to strengthen the economic, social and territorial cohesion of the Union in the interest of promoting sustainable development.” (European Commission, 2015a) EAFRD which relies on regulation 1305/2013, aims “to promote sustainable rural development throughout the Union.” (European Commission, 2015a) Finally EMFF, which relies on regulation 508/2014, aims to “supports EU maritime and fisheries policies for 2014-2020.” (European Commission, 2015a)

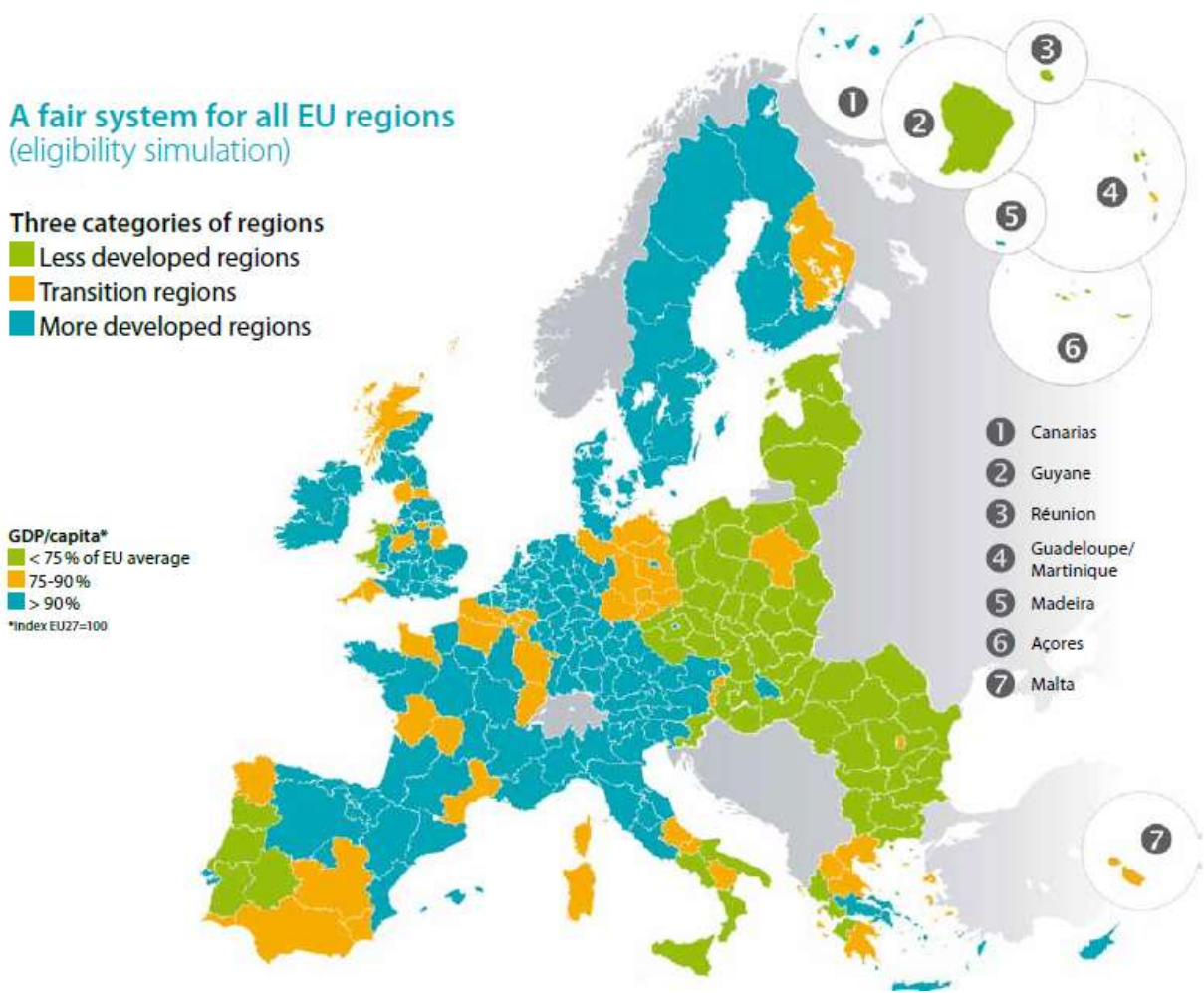
The maximum co-financing rates, depending on the Funds are established as follow:

- ERDF and ESF: between 50% and 85%
- Cohesion Fund: 85%;
- EMFF: 75%;
- EAFRD: between 53% and 85%. (European Commission, 2015a)

All together, the funds, considering also the national budgets, add up to 450 billion euro.

In order to receive the sums, regions have been divided into three main categories according to their per capita Gross Domestic Product or GDP. Figure 1.2 shows that less developed regions are the ones whose per capita GDP is below 75% of the EU's average. Regions that fall in this category receive a “financing rate of between 75% and 85%” (European Union, 2011) Transition regions are the ones that have a per capita GDP between 75% and 90% of the EU's average, therefore, they can receive a “co-financing rate of 60%” (European Union, 2011). Finally, more developed regions are the ones whose per capita GDP is above the 90% of EU's average. Hence, “the co-financing rate is 50%.” (European Union, 2011)

**Figure 1.2 - European categories of regions**

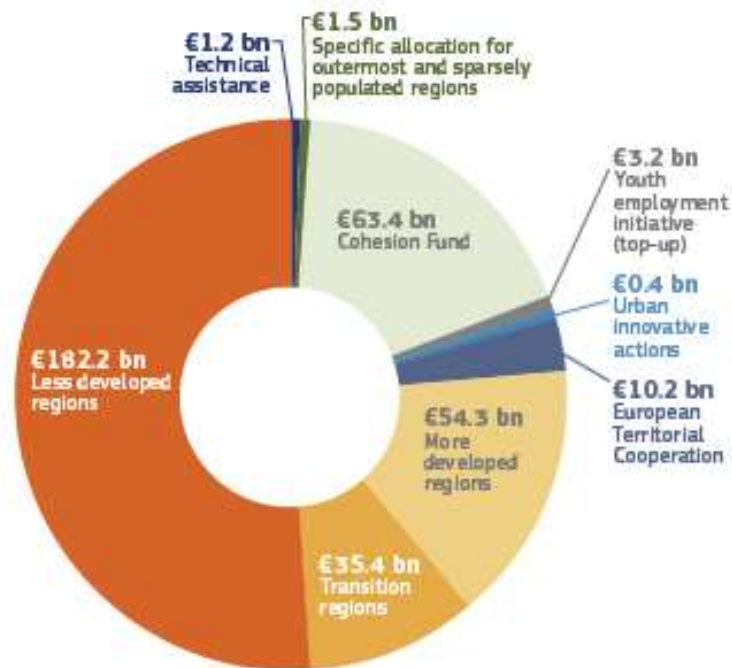


Source: “Cohesion Policy 2014-2020, Investing in Europe’s Regions”, page 6.

As illustrated in figure 1.3, more than half of the Cohesion Policy Funding is directed to less developed regions, which are the main target of the Cohesion Policy, with a significant difference to the funding directed to transition and more developed regions. This because the Cohesion Policy aims to reduce the gap between lagging and developed regions. Therefore, in order to make an effective policy of cohesion, it is important to invest more to regions that more struggle to grow.



**Figure 1.3 – Cohesion Policy Funding 2014-2020**



Source: “An introduction to EU Cohesion Policy 2014-2020”, page 7.

The Cohesion Policy has laid out 11 growth objectives, that regions have invest into, in order to meet the goals of Europe 2020 strategy. Figure 1.4 shows the thematic objectives. Smart Specialisation applies specifically to thematic objective number one and two and it is considered an ex-ante conditionality in order to receive the funds.

**Figure 1.4 – Eleven thematic objectives**



Source: “An introduction to EU Cohesion Policy 2014-2020”, page 5.

Smart Specialisation Strategies, also called Research and Innovation Strategies for Smart Specialisation, are integrated, place-based, economic transformation agendas that do five important things:

- They focus policy support and investments on the key national/regional priorities, challenges and needs for knowledge-based development.
- They build each country region’s strengths, competitive advantages and potential for excellence.
- They support technological as well as practice-based innovation and aim to stimulate private sector investments.
- They get stakeholders fully involved and encourage innovation and experimentation.

They are evidence-based and include sound monitoring and evaluation systems. (European Commission, 2012 - Guide to Research and Innovation Strategies for Smart Specialisation page 8)

Smart Specialisation is an innovative policy concept, which defines a method to identify areas of innovation policy intervention. Thus, it does not require regions to specialize in a particular sector or field, but it assists them in finding those new activities that can constitute a regional competitive advantage, and also show them how they would benefit from specializing with R&D and innovation projects in such activities.

What distinguishes Smart Specialisation from traditional innovation policies is the so-called ‘Entrepreneurial Discovery Process’ (EDP). Using the words of Dominique Foray, Paul A. David and Bronwyn Hall in their article ‘Measuring Smart Specialisation – the Concept’, “when a region have to invest in R&D, it is mostly better if that region specialises itself on those field and assets where it has a competitive advantage and can excel, rather than spreading investment in several and not specific technology and knowledge frontiers.”(David et al., 2009) Therefore, regions should

embark an entrepreneurial discovery process “that can reveal what a country or region does best in term of science and technology.” (David et al., 2009) So that, in this learning process, entrepreneurial actors assume a “leading role in discovering promising areas of future specialisation” (David et al., 2009) Therefore, entrepreneurs are in the situation to guide the future development of the region being “well placed to explore and identify new activities” David et al., 2009). However, because often they do not have the necessary resources to expand their enterprises and their discovery activity, the public administration should intervene in order to effectively support this process. Thus, it is from this point that the entrepreneurial aspect assumes a broader sense, including business world, public administration, research bodies and final users/ civil society. This new structure is called “Quadruple Helix.”

The quadruple helix allows different entities to cooperate and co-invent in order to jointly exploit the main domains of the regional economy. Regions become the entrepreneurs of themselves and with their governmental polices regions “supplies incentives to encourage entrepreneurs; evaluates and assess effectively the most relevant and promising sectors; identifies complementary investments associated with the emerging specialisations.” (David et al., 2009) This innovative way of acting opens to exploit new opportunities and enables regions to become leaders in the domains where they have a competitive advantage.

## **1.2 The references of the Assessment Wheel 2.0**

In this section the main source that compose the structure of the Assessment Wheel 2.0 will be described. They are: the RIS3 Guide, the Online S3 Platform and the Assessment Wheel created by Christian Saublens.

### *1.2.1 The RIS3 Guide and the Online S3*

The Guide to Research and Innovation Strategies for Smart Specialisation, also called RIS3 Guide, is a document that was conceived in May 2012 by Dominique Foray, John Goddard, Xabier Goenaga Beldarrain, Mikel Landabaso, Philip McCann, Kevin Morgan, Claire Nauwelaers, Raquel Ortega-Argilés, as methodological guidance for policy-makers on how to design, draft and implement national/regional research and innovation strategies for smart specialisation.

The Online S3 Platform instead, was developed by a Horizon 2020-funded project called “On-Line S3” started in May 2016 and it is being implemented by a consortium of twelve partners from different countries of the EU. “The goal of the platform is to assist RIS3 stakeholders in forming, revising national/regional RIS3 through using its tools.” (‘Online S3 New methods for the RIS3 design and implementation’, 2017)

Both of them have the same structure and aim. In fact they are conceived to help policymakers to draw up and design the RIS3s, therefore by following their guidelines, policymakers should divide the strategy in six different steps or phases, described below.

- *Step 1 - Analysis of the regional context and potential for innovation*  
The first step concerns with the analysis of the regional context and potential for innovation. It is based on the analysis of the regional economy and its innovation structure as its main assets for future development.
- *Step 2 - Governance: ensuring participation and ownership*  
This step concerns with the structure of the Governance that a good strategy should have. The governance system of a typical RIS project revolved around three elements: the Steering group responsible for the overall strategy, the Management Team responsible for implementing the RIS3 projects and the Working Group, which help to build up consensus.
- *Step 3 - Elaboration of an overall vision for the future of the region*  
Step three concerns with the development of a shared vision in the economic development of the region and its direction for its international positioning. “One of the main aspects of a shared vision is its capacity to attract and engage stakeholders around a common project or dream ‘mobilising power’”.
- *Step 4 – Identification of priorities*  
This step concerns with the selection of the right priorities and channel resources towards the investments that have the potentially highest impact on the regional economy. Priorities in RIS3 need to define concrete and achievable objectives based on competitive advantage and potential, and define technological, sectorial or cross-sectorial priority areas.
- *Step 5 - Definition of a coherent policy mix, roadmaps and action plan*  
This step concerns with the definition of a roadmap, with the combinations of action plans and pilot projects. The action plan it is a way of detailing and organising all the rules and tools a region needs in order to reach the prioritised goals, whereas pilot projects serve to underline the fact that the strategy is going to be concretely implemented.
- *Step 6 - Integration of monitoring and evaluation mechanisms*  
The last step of RIS3 design concerns about the monitoring and evaluation mechanisms. This is an important phase because monitoring indicators and planning evaluations are important elements of the RIS3 design process both at the level of strategy and the

different components of the Action Plan. (European Commission, 2012 - Guide to Research and Innovation Strategies for Smart Specialisation pages 18,21,22,23,24)

Fundamentally, RIS3 Guide and Online S3 may be thought of as complementary. On the one hand, the RIS3 Guide offers meaningful theoretical methodologies and information to underpin the RIS3's design, whereas, on the other hand, the Online S3 gives access to a wide range of practical ICT tools and methodologies to make the six steps of the RIS3 effective. The information contained in the tables of the Assessment Wheel 2.0 comes from these two sources.

### *1.2.2 The Assessment Wheel*

The structure of the Assessment Wheel 2.0 follows the same structure of the Assessment Wheel, elaborated by the Smart Specialisation Strategy Platform “on the basis of the original contribution and proposal by Christian Saublens, Executive Manager of EURADA – the European Association of Development Agencies.” (‘Assessment Wheel - Smart Specialisation Platform’, 2018)

The Assessment Wheel comes from a questionnaire for RIS3 expert contained in the Annex III of the RIS3 Guide and was conceived “as a tool for the synthetic representation of the progress made in drafting/designing a RIS3 and it allows to condense a huge amount of information in one visual modality.” (‘Assessment Wheel - Smart Specialisation Platform’, 2018)

The Wheel is constituted by two parts. The first part is a table (figure 1.5), which is composed by five columns and eighteen rows. In the first column the six steps of the RIS3 Guide are listed, whereas in the second column eighteen critical factors (three critical factors for each of the six steps) are present and they refer to the macro areas of analysis of the strategy. In the third column, called “Marks”, a score from 0 to 5 to each one of the critical factors is given according to the following modality:

- 0 = no information available on the specific element
- 1 = poor
- 2 = to be improved
- 3 = fair
- 4 = strong
- 5 = excellent

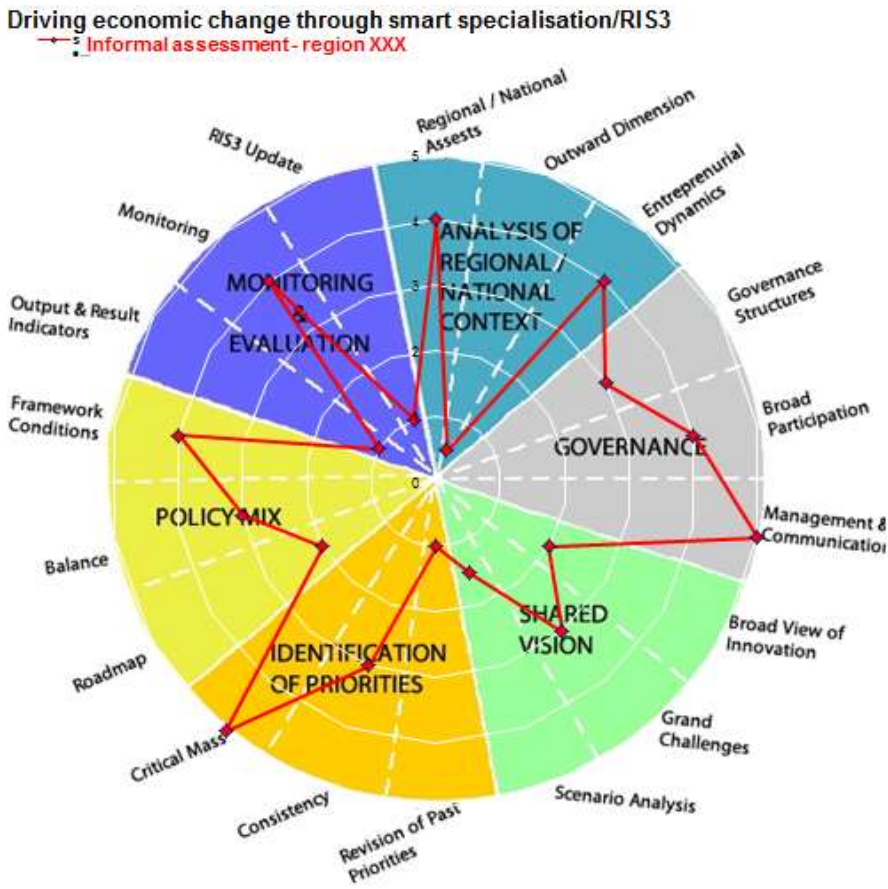
The second part is composed by a spider graph (figure 1.6), which displays the final result of the marks in one visual modality. The red line on the graph depicts the score that each of the critical factors has received and the form is determined by their minimum and maximum peaks.

Figure 1.5 – Assessment Wheel’s table

RIS3 Guide Steps	Sections	Marks	RIS3 Guide reference	Short explanatory
STEP 1 ANALYSIS OF REGIONAL / NATIONAL CONTEXT	Regional / National Assets	0 to 5	Step 1 (page 18) + Annex I (pages 28- 33)	- regional / national assets' endowment - SWOT - innovation potential & skills for knowledge based development
	Outward Dimension	0 to 5	Step 1 (page 19) + Annex I (pages 28- 33)	- connectivity - knowledge, trade & skills flows - positioning in trans-regional and international value chains - trans-regional/international collaboration networks
	Entrepreneurial Dynamics	0 to 5	Step 1 (page 20) + Annex I (pages 28- 33)	- start-ups, clusters, entrepreneurial networks - FDI - new forms of self-employment, etc.
STEP 2 GOVERNANCE	Governance Structures	0 to 5	Step 2 (page 21) + Annex I (pages 34- 44)	- identification of specific bodies and definition of their tasks, roles and responsibilities
	Broad Participation	0 to 5		- interactive, consensus-based application of collaborative leadership principles - quadruple helix actors (involvement of boundary spanners)
	Management & Communication	0 to 5		- use of open forum discussion and citizen dialogue - e-governance
STEP 3 SHARED VISION	Broad View of Innovation	0 to 5	Step 3 (page 22) + Annex I (pages 45- 50)	- are social, organisational, service and market innovation considered beside technological and science based innovation?
	Grand Challenges	0 to 5		- societal inclusive, environmental and sustainable economic development
	Scenario Analysis	0 to 5		- risk assessment and contingency plan for possible future changes
STEP 4 IDENTIFICATION OF PRIORITIES	Revision of Past Priorities	0 to 5	Step 4 (page 22) + Annex I (pages 51- 52)	- critical revision of past experiences (from RIS to RIS3) - dynamic identification of actual or potential areas with competitive advantages
	Consistency	0 to 5		- alignment with context analysis and harvesting of entrepreneurial discoveries and DAE
	Critical Mass	0 to 5		- concentration of resources to the limited number of priorities
STEP 5 POLICY MIX	Roadmap	0 to 5	Step 5 (page 23) + Annex I (pages 53- 58)	- including action plan and pilot projects
	Balance	0 to 5		- appropriate mix of targeted and horizontal measures
	Framework Conditions	0 to 5		- e.g. allowing for support to experimentation, etc.
STEP 6 MONITORING & EVALUATION	Output & Result Indicators	0 to 5	Step 6 (pages 24- 25) + Annex I (pages 59-64)	- selection of a limited number of output & result indicators linked to priorities with clearly identified baselines and targets
	Monitoring	0 to 5		- mechanisms, supported by appropriate data collection, to verify how the activities in the RIS3 are delivering the output and result targets
	RIS3 Update	0 to 5		- revision of priorities and policy mix as a result of the monitoring exercise

Source: “Annex III RIS3 Guide”, page 14.

**Figure 1.6 – Assessment Wheel’s spider graph**



Source: ‘Assessment Wheel - Smart Specialisation Platform’.

### 1.3 The threefold method

In this section the elements that compose the threefold method will be displayed and explained. The first part will be devoted to the description of the six tables that compose the Assessment Wheel 2.0. The second part concentrates to the definition of the specifications of the standard deviation, whereas in the third part the settings of the Fuzzy Lite program will be displayed.

#### 1.3.1 The Assessment Wheel 2.0

In this section, the idea, which builds upon the Wheel created by Saublens, will be provided. Firstly, it has been decided to create six tables which refer to the six steps of the RIS3 Guide; each table



corresponds to a specific step of the Guide. Basically, the tables follow the same structure of Saublen's table. However, it has decided to re-label the steps 1-3-5; the column "Sections", which is now named "Priority areas"; and the column "Short explanatory", which is now called "Topics". Moreover, a fourth column named "Tools" is added, where more specific elements relevant for the assessment of each of the three "Topics" are identified. This is the major change with respect to Saublens' table, because the fourth column gives a more precise idea of what should be sought during the analysis of a RIS3. The presence or the absence of the indicated tools, useful for a correct design of the strategy, is an important indicator that could reveal whether the decision-makers of a RIS3 have considered enough information or not. Regarding the choice of all the elements present in the tables below, we have selected the elements, pieces of information or aspects that we consider more relevant for the assessment and that may condense a vast number of features. The six tables, from table 1.1 to 1.6, are below presented.

**Table 1. 1– Step 1: Regional Context and potential for innovation**

<b>Priority area</b>	<b>References</b>	<b>Topics</b>	<b>References</b>	<b>Tools</b>	<b>References</b>	<b>Marks</b>
Regional or National assets	RIS3 Guide: Page 18	Regional context assessment	RIS3 Guide Page 18	<ul style="list-style-type: none"> <li>• SWOT analysis</li> <li>• Asset mapping</li> </ul>	RIS3 Guide: Page 19 Online S3: Method 2.1	
		Related variety analysis	Online S3: Method 4.3	<ul style="list-style-type: none"> <li>• Research infrastructure mapping</li> <li>• Cluster, incubators and innovation ecosystem mapping</li> </ul>	Online S3: Method 2.2, Method 2.3	
		Differentiation patterns	RIS3 Guide: Page 18	<ul style="list-style-type: none"> <li>• New activities emerging</li> <li>• Well-established activities</li> <li>• SWOT analysis</li> </ul>	RIS3 Guide Page 18, Page 19	
Beyond regional boundaries	RIS3 Guide: Page 19	Position of the region within the European and global economy	RIS3 Guide: Page 18	<ul style="list-style-type: none"> <li>• Benchmarking</li> </ul>	Online S3: Method 2.4	
		Linkages and flows of goods, services, and knowledge	RIS3 Guide: Page 18, Page 19	<ul style="list-style-type: none"> <li>• Human resources: mobility of personnel and researcher</li> <li>• International cluster cooperation</li> <li>• Specialisation indexes</li> </ul>	RIS3 Guide: Box 5, page 31 Page 69 Method 2.6 (Online S3)	
		Interregional collaborations		<ul style="list-style-type: none"> <li>• Policy mix and framework conditions: cooperation at EU levels in policies (innovation, education, ICT, R&amp;D)</li> </ul>	RIS3 Guide: Box 5, page 31	
Entrepreneurial discovery	RIS3 Guide: Page 20	Areas of grates future potential development	RIS3 Guide: Page 20	<ul style="list-style-type: none"> <li>• Regional economic, scientific and technological specialisation</li> </ul>	RIS3 Guide: Page 29	
		Regional entrepreneurial environment assessment	RIS3 Guide: Page 20	<ul style="list-style-type: none"> <li>• Performance indicators</li> <li>• Scientific production indicators (patents, citation, R&amp;D)</li> <li>• Entrepreneurship: conditions for SME and start-ups</li> <li>• Public sector procurement</li> </ul>	RIS3 Guide : Page 30, Page 29, Box 5, page 31, Box 5, page 31	
		Foresight	Page 32	<ul style="list-style-type: none"> <li>• Delphi</li> <li>• Critical &amp; key technology study</li> <li>• SWOT analysis</li> </ul>	Online S3: Method 3.3 RIS3 Guide: Table 1 page 33, Page 19	

Source: “Assessing Smart Specialisation Strategies: a threefold method applied to The Basque Country’s RIS3” by Filippo Ferrarini, Section 2.3.1.

**Table 1.2 – Step 2: Governance**

<b>Priority area</b>	<b>References</b>	<b>Topics</b>	<b>References</b>	<b>Tools</b>	<b>References</b>	<b>Marks</b>
Quadruple helix engagement	RIS3 Guide: Page 37	Collaborative leadership building	RIS3 Guide: Page 38	<ul style="list-style-type: none"> <li>• Collaborative practices of actors</li> <li>• Innovation user groups</li> <li>• Network partnerships</li> </ul>	RIS3 Guide: Page 37,38, 39	
		Boundary Spanners	RIS3 Guide: Page 38	<ul style="list-style-type: none"> <li>• Actors that transfer technology and exchange knowledge</li> <li>• Business services and management consultancy</li> </ul>	RIS3 Guide: Page 38	
		Business community involvement	RIS3 Guide: Page 39	<ul style="list-style-type: none"> <li>• Sector champion</li> </ul>	RIS3 Guide: Page 39	
Governance structure definition	RIS3 Guide: Page 25	Steering group	RIS3 Guide: Page 38	<ul style="list-style-type: none"> <li>• Identification of specific bodies and definition of their tasks, roles, and responsibilities</li> </ul>		
		Management team	RIS3 Guide: Page 39			
		Working group	RIS3 Guide: Page 39			
Multi-fund approach	RIS3 Guide: Page 41	RIS3 budgeting	Online S3: Method 5.3	<ul style="list-style-type: none"> <li>• Identification of different budgetary sources: private, national/regional, ESIF, Horizon 2020.</li> <li>• Synergies between different funding streams</li> </ul>	Online S3: Method 5.3 RIS3 Guide: Page 43	
		Technical assistance funding	RIS3 Guide: Page 42	<ul style="list-style-type: none"> <li>• Scenario-planning</li> <li>• Foresight</li> </ul>	RIS3 Guide: Page 42, Page 32	
		National and RIS3 policies alignment	RIS3 Guide: Page 43	<ul style="list-style-type: none"> <li>• Alignment between RIS3 objectives and national strategies</li> <li>• RIS3 legal and administrative framework</li> </ul>	RIS3 Guide: Page 43 Online S3: Method 1.4	

Source: “Assessing Smart Specialisation Strategies: a threefold method applied to The Basque Country’s RIS3” by Filippo Ferrarini, Section 2.3.1.

**Table 1.3 – Step 3: Overall vision for the future of the region**

<b>Priority area</b>	<b>References</b>	<b>Topics</b>	<b>References</b>	<b>Tools</b>	<b>References</b>	<b>Marks</b>
Depict a regional scenario	RIS3 Guide: Page 22	Identification of regional features	RIS3 Guide: Page 47	<ul style="list-style-type: none"> <li>• Europe 2020 dimensions</li> </ul>	RIS3 Guide: Figure 6, page 47	
		Regional international perspective	RIS3 Guide: Page 47	<ul style="list-style-type: none"> <li>• Definition of the main strategy related to the type of the region</li> </ul>	RIS3 Guide: Table 3, page 48	
		Connectivity degree	RIS3 Guide: Page 47	<ul style="list-style-type: none"> <li>• Internal and external connectivity</li> </ul>	RIS3 Guide: Table 4page 49	
Create a common and clear vision of the region	RIS3 Guide: Page 22	Mobilising power	RIS3 Guide: Page 45	<ul style="list-style-type: none"> <li>• Definition of the RIS3 project and dream</li> </ul>	RIS3 Guide: Page 45	
		Renewal and transformation path	RIS3 Guide: Page 45	<ul style="list-style-type: none"> <li>• Scenario building</li> </ul>	Online S3: Method 3.2	
		Meeting societal challenge	RIS3 Guide: Page 45	<ul style="list-style-type: none"> <li>• Providing healthier living conditions</li> <li>• Reducing outmigration</li> <li>• Employment opportunities</li> </ul>	RIS3 Guide: Page 45	
Communication strategies	RIS3 Guide: Page 49	Definition of goals	Ris3 Guide: Page 49	<ul style="list-style-type: none"> <li>• Place RIS3 in national/Europe context</li> <li>• Inform and create an attractive image</li> </ul>	RIS3 Guide: Page 49	
		Identification of target groups	RIS3 Guide: Page 50	<ul style="list-style-type: none"> <li>• RIS3 vision sharing</li> </ul>	Online S3: Method 1.1	
		Definition of communication tools	RIS3 Guide: Page 50	<ul style="list-style-type: none"> <li>• RIS3 debate</li> <li>• Brochures, websites, social media, press, local media, workshops</li> </ul>	RIS3 Guide: Page 50 Online S3: Method 1.3	

Source: “Assessing Smart Specialisation Strategies: a threefold method applied to The Basque Country’s RIS3” by Filippo Ferrarini, Section 2.3.1.

**Table 1.4 – Step 4: Identification of priorities**

<b>Priority area</b>	<b>References</b>	<b>Topics</b>	<b>References</b>	<b>Tools</b>	<b>References</b>	<b>Marks</b>
Innovation and research priorities	RIS3 Guide: Page 22	Learning from the past	RIS3 Guide: Page 52	<ul style="list-style-type: none"> <li>• Revision of the past experiences</li> </ul>	RIS3 Guide: Page 52	
		Highest potential impact analysis	RIS3 Guide: Page 51	<ul style="list-style-type: none"> <li>• Extroversion analysis</li> <li>• EDP focus group</li> </ul>	Online S3: Method 4.1, 4.2	
		Concrete and achievable objectives and niches.	RIS3 Guide: Page 51	<ul style="list-style-type: none"> <li>• Clear objective definition and alignment with regional potential innovation/differentiation</li> </ul>	RIS3 Guide: Page 51	
Development of priority areas	Created by the author	Tech and cross-sectoral priorities	RIS3 Guide: Page 51	<ul style="list-style-type: none"> <li>• Existence of key assets and capabilities for each of the areas proposed</li> <li>• Diversification potential and critical mass</li> </ul>	RIS3 Guide: Page 51	
		Horizontal priorities	RIS3 Guide: Page 51			
		Priority areas presentation	RIS3 Guide: Page 52	<ul style="list-style-type: none"> <li>• Specific presentation of the areas</li> <li>• Avoidance of failing approaches</li> <li>• Catalyse the structural change</li> </ul>	RIS3 Guide: Page 51, 52	
Innovation delivery instruments	RIS3 Guide: Annex II, page 65	KETs and Digital agenda	RIS3 Guide: page 81,86	<ul style="list-style-type: none"> <li>• Network infrastructure</li> <li>• Digital growth</li> <li>• Six KETs of Europe</li> <li>• Economic niches in KET</li> </ul>	RIS3 Guide: Page 83, 86	
		Cultural and creative industries and innovative procurement	RIS3 Guide: Page 88,100	<ul style="list-style-type: none"> <li>• Mapping cultural and creative industries</li> <li>• Involve cultural actors</li> <li>• Development of new public procurement</li> <li>• Change in procurement practices</li> </ul>	RIS3 Guide: Page 90, 102	
		Green growth and social innovation	RIS3 Guide: Page 105,109	<ul style="list-style-type: none"> <li>• Sustainable energy, eco-innovations</li> <li>• Urban regeneration</li> <li>• Microfinance and workplace innovation</li> <li>• Social value and initiatives</li> </ul>	RIS3 Guide: page 107, 110	

Source: “Assessing Smart Specialisation Strategies: a threefold method applied to The Basque Country’s RIS3” by Filippo Ferrarini, Section 2.3.1.

**Table 1.5 – Step 5: Definition of the policy mix and action plan**

<u>Priority area</u>	<u>References</u>	<u>Topics</u>	<u>References</u>	<u>Tools</u>	<u>References</u>	<u>Marks</u>
Composition of the policy mix	RIS3 Guide: Page 53	Traditional, emerging and experimental instruments	RIS3 Guide: Table 5 and 6, page 54	<ul style="list-style-type: none"> <li>• Innovation delivery instruments</li> </ul>	RIS3 Guide: Table 5 and 6, page 54	
		Knowledge generation, diffusion, and exploitation				
		Global, regional or individual target				
Action plan	RIS3 Guide: Page 53	Definition of strategic objectives	RIS3 Guide: Page 53	<ul style="list-style-type: none"> <li>• Deep analysis of the topic</li> </ul>	RIS3 Guide: Page 53	
		Definition of actors involved and targets	RIS3 Guide: Page 53			
		Definition of timeframes	RIS3 Guide: Page 53			
Pilot project	RIS3 Guide: Page 53	Definition of the projects	RIS3 Guide: page 58	<ul style="list-style-type: none"> <li>• Provide reliable evidence about the topic</li> </ul>		
		Relevance with respect to RIS3 priorities	RIS3 Guide: Page 58			
		Expected impact	RIS3 Guide: Page 58			

Source: “Assessing Smart Specialisation Strategies: a threefold method applied to The Basque Country’s RIS3” by Filippo Ferrarini, Section 2.3.1.

**Table 1.6 – Step 6: Monitoring and evaluation**

<u>Priority area</u>	<u>References</u>	<u>Topics</u>	<u>References</u>	<u>Tools</u>	<u>References</u>	<u>Marks</u>		
Indicators	RIS3 Guide: Page 59	Result indicators	RIS3 Guide: page 59	<ul style="list-style-type: none"> <li>• Check for their presence and explanation about how they must be used</li> </ul>				
		Context indicators	RIS3 Guide: page 59					
		Output indicators	RIS3 Guide: page 59					
Objective and expected results	RIS3 Guide: Page 61	Programme aims	RIS3 Guide: Table 10, page 61	<ul style="list-style-type: none"> <li>• Intervention logic</li> <li>• Check the presence of proper indicators</li> </ul>	Online S3: Method 5.1			
		Outputs						
		Short, medium, long-term results					RIS3 Guide: Table 10, page 61	
RIS3 update	RIS3 Guide: Page 62	Monitoring framework	Invented by the author	<ul style="list-style-type: none"> <li>• Balance scorecard</li> <li>• RIS3 social media analysis</li> <li>• Official databases</li> <li>• Ad hoc surveys</li> <li>• Regional or national statistics</li> </ul>	Online S3: Method 6.3, 6.5			
		Peer review	Peer review platform				<ul style="list-style-type: none"> <li>• Peer review presence</li> </ul>	Peer review platform
		Orientation	RIS3 Guide: Box 6, page 63				<ul style="list-style-type: none"> <li>• Outward orientation: position of the region with competitors</li> <li>• Future orientation: evolution of the regional competitive position</li> </ul>	RIS3 Guide: Page 64

Source: “Assessing Smart Specialisation Strategies: a threefold method applied to The Basque Country’s RIS3” by Filippo Ferrarini, Section 2.3.1.

Once the assessment is completed the six tables are gathered together in a big main table. Moreover, the marks given, will be also showed in a spider graph that displays the final result in one visual modality. The final table and the spider graph are presented in section 1.3.4, “An example.”

### 1.3.2 The Standard Deviation

The standard deviation is a measure of the dispersion of a set of data from its mean. If the data points are further from the mean, there is higher deviation within the data set. In our case, the data points are the marks of the eighteen priority areas of the Assessment Wheel 2.0. This is an important concept because it helps us to consider as relevant element, not only the single value of marks, but also their composition. The grade of dispersion of a strategy might be important to be calculated in cases that two strategies have the same mean. The strategy that is less dispersed can be considered a better strategy with respect to the more dispersed one. The idea is to make the arithmetical mean of the marks worse by using the standard deviation. We have decided to use just the 20% of the standard deviation, otherwise the result would have been too worse. Let's take the following example in table 1.7 of region X and region Y .

**Table 1.7 – Weighted mean example (20% of the standard deviation)**

	<b>Region X</b>	<b>Region Y</b>
<i>Marks</i>	5, 0, 5, 0, 5	2.5, 2.5, 2.5, 2.5, 2.5
<i>Arithmetic mean 'M'</i>	2,5	2.5
<i>Standard deviation 'ST.DEV'</i>	2.739	0
<i>Weighted mean = <math>M - (0.20 * ST.DEV)</math></i>	$3 - (0.20 * 2.739) = 3 - 0.548 = \mathbf{2.452}$	$2.5 - (0.20 * 0) = \mathbf{2.5}$

Source: “Assessing Smart Specialisation Strategies: a threefold method applied to The Basque Country’s RIS3” by Filippo Ferrarini, Section 2.3.2.

Both regions have the same arithmetic mean, but thanks to the standard deviation, the weighted mean result lower in region X and higher in region Y. Therefore, the method represents a way to provide benchmarks between the assessments of two different regions in order to have more information about the effectiveness and quality of their strategies. At same level of marks, a region that is more homogeneous is considered better than a less homogeneous one.



### 1.3.3 *The Fuzzy Logic*

In this section, an introduction to the fuzzy logic is presented. “A fuzzy logic set is a class of objects with a continuum of grades of membership. Such a set is characterized by a membership function which assigns to each object a grade of membership between 0 and 1.” (Zadeh L.A, 1965)

In the classic theory, an element can belong or not to a set, therefore it can assume only the value of 1 if it belongs, or the value of 0 if it not belongs. However, in the case of fuzzy logic, an element can belong to that set with a certain grade of membership, which takes values of 1, for those elements that completely belong to the set and 0 for those elements that do not belong at all. Intermediate values, those between 0 and 1, belong partially to the set. In the Fuzzy Logic the concept of linguistic variable is utilized, which takes linguistic values, such as “short”, “tall”, or “very tall” instead of using concrete values such as 1.80m, 1.90m, etc. “The Fuzzy Logic works with three components: a fuzzifier, a base of rules and a defuzzifier. The fuzzifier is mechanism that converts the inputs linguistic variables into a fuzzy set.” (Cearra Mendialdua, María Orizaola Iniesta, & Jiménez, 2014)

To carry out the analysis, we have used the “qtfuzzylite”, which is a Fuzzy Logic control application developed by Juan Rada-Vilela. Regarding the assessment method, we have decided to use the Fuzzy Logic method to analyse the RIS3 in a more homogeneous and objective way. This process requires two phases: 1) Evaluate each of the six steps, starting from the priority areas; 2) Give a final judgement of the RIS3 by using the outputs of the six steps (generated in phase 1) as inputs.

1) The inputs are the marks of the priority areas of the Assessment Wheel 2.0. In our case, we consider three inputs, with three different ‘classes of marks’ and one only output with five different classes of marks. The inputs are classified as:

- Insufficient → from 0 to 2.20 points (trapezoid);
- Acceptable → from 1.40 to 3.60 points (triangle);
- Very good → from 2.80 to 5 points (trapezoid).

On the other hand, the output is classified in the following way:

- Insufficient → from 0 to 1.60 points (trapezoid);

- Lacking → from 0.85 to 2.45 points (triangle);
- Acceptable → from 1.70 to 3.30 points (triangle);
- Good → from 2.55 to 4.15 points (triangle);
- Excellent → from 3.40 to 5.00 points (trapezoid).

As it is possible to notice, there is an overlapping between the different linguistic variables. This is the key element of the Fuzzy Logic approach because with this system it is admitted the possibility of the existence of more than one fuzzy set, which means that different inference rules could be activated, in order to give a more precise grade of probability of the truth of the output. Let's make an example: if a priority area receives a mark of 1.5, it could be both insufficient (since its range is from 0 to 2.20) or acceptable (its range is from 1.40 to 3.60), but with different grades of membership.

The inputs will be used for the evaluation of each of the six steps. Hence, the rule block will be composed by 27 possible different combinations. As it has already been explained, each step will receive three marks, that we will call A, B and C. In the list below, all the rules that operate in the programme are listed, as they appear in the Fuzzy Lite settings:

- 1) if A is INSUFFICIENT and B is INSUFFICIENT and C is INSUFFICIENT, then OUTPUT is INSUFFICIENT;
- 2) if A is INSUFFICIENT and B is INSUFFICIENT and C is ACCEPTABLE, then OUTPUT is LACKING;
- 3) if A is INSUFFICIENT and B is INSUFFICIENT and C is GOOD, then OUTPUT is LACKING;
- 4) if A is INSUFFICIENT and B is ACCEPTABLE and C is INSUFFICIENT, then OUTPUT is LACKING;
- 5) if A is INSUFFICIENT and B is ACCEPTABLE and C is ACCEPTABLE, then OUTPUT is LACKING;
- 6) if A is INSUFFICIENT and B is ACCEPTABLE and C is GOOD, then OUTPUT is ACCEPTABLE;
- 7) if A is INSUFFICIENT and B is GOOD and C is INSUFFICIENT, then OUTPUT is LACKING;

- 8) if A is INSUFFICIENT and B is GOOD and C is ACCEPTABLE, then OUTPUT is ACCEPTABLE;
- 9) if A is INSUFFICIENT and B is GOOD and C is GOOD, then OUTPUT is GOOD;
- 10) if A is ACCEPTABLE and B is INSUFFICIENT and C is INSUFFICIENT, then OUTPUT is LACKING;
- 11) if A is ACCEPTABLE and B is INSUFFICIENT and C is ACCEPTABLE, then OUTPUT is LACKING;
- 12) if A is ACCEPTABLE and B is INSUFFICIENT and C is GOOD, then OUTPUT is ACCEPTABLE;
- 13) if A is ACCEPTABLE and B is ACCEPTABLE and C is INSUFFICIENT, then OUTPUT is LACKING;
- 14) if A is ACCEPTABLE and B is ACCEPTABLE and C is ACCEPTABLE, then OUTPUT is ACCEPTABLE;
- 15) if A is ACCEPTABLE and B is ACCEPTABLE and C is GOOD, then OUTPUT is GOOD;
- 16) if A is ACCEPTABLE and B is GOOD and C is INSUFFICIENT, then OUTPUT is ACCEPTABLE;
- 17) if A is ACCEPTABLE and B is GOOD and C is ACCEPTABLE, then OUTPUT is GOOD;
- 18) if A is ACCEPTABLE and B is GOOD and C is GOOD, then OUTPUT is GOOD;
- 19) if A is GOOD and B is INSUFFICIENT and C is INSUFFICIENT, then OUTPUT is LACKING;
- 20) if A is GOOD and B is INSUFFICIENT and C is ACCEPTABLE, then OUTPUT is ACCEPTABLE;
- 21) if A is GOOD and B is INSUFFICIENT and C is GOOD, then OUTPUT is GOOD;
- 22) if A is GOOD and B is ACCEPTABLE and C is INSUFFICIENT, then OUTPUT is ACCEPTABLE;
- 23) if A is GOOD and B is ACCEPTABLE and C is ACCEPTABLE, then OUTPUT is GOOD;
- 24) if A is GOOD and B is ACCEPTABLE and C is GOOD, then OUTPUT is GOOD;
- 25) if A is GOOD and B is GOOD and C is INSUFFICIENT, then OUTPUT is GOOD;
- 26) if A is GOOD and B is GOOD and C is ACCEPTABLE, then OUTPUT is GOOD;

- 27) if A is GOOD and B is GOOD and C is GOOD, then OUTPUT is EXCELLENT.

Regarding the output that will be generated by the programme, we have decided to use the method of aggregation called ‘maximum’, whereas as defuzzifier we consider the so-called ‘centroid’.

2) To provide a final evaluation of the RIS3 of a region, we will combine all three different linguistic variables from the six steps described earlier, using the same input settings, in a second Fuzzy Logic process. The input value for each step will be output given in the first phase, according to the five classes of marks earlier described. This will require a total of 729 rules ( $3^6$  equals 729).

In the following section, an example of how the threefold method works, is provided.

#### *1.3.4 An example*

The best possible example that can be applied to new method is to show the differences between the assessment of two possible regional or national strategies which display equal marks in terms of their ‘arithmetic means’. In this way, it is possible to compare the homogeneity of the strategies through standard deviation and to have a final mark using the linguistic variables of the Fuzzy Logic.

We will consider two given strategies: strategy A and strategy B. The former presents a linear evaluation with eighteen marks as ‘2.5’, whereas the latter has the same arithmetic mean, but an evaluation with nine marks as ‘0’ (the minimum) and nine as ‘5’ (the maximum). In tables 1.8 and 1.9 below, it is showed the results of the two different assessments.

**Table 1.8 – Assessment Wheel 2.0 and Standard Deviation, Strategy A**

<b>RIS3 Assessment Wheel 2.0 - Strategy A</b>		<b>Insert marks between 0 and 5 in this column (half points i.e. 3,5 are possible)</b>	<b>The structure of this table is taken from the original Assessment Wheel, developed by Christian Saubliens, and modified by Filippo Damiani and Filippo Ferrarini based on the guidelines in the RIS3 Guide and in the Online S3.</b>
<b>RIS3 Steps</b>	<b>Priority Areas</b>	<b>Marks</b>	<b>Topics</b>
<b>REGIONAL CONTEXT AND POTENTIAL FOR INNOVATION</b>	<b>Regional assets</b>	<b>2,5</b>	Regional context assessment Related variety analysis Differentiation patterns
	<b>Beyond regional boundaries</b>	<b>2,5</b>	Position of the region within the European and global economy Linkages of flows of goods, services and knowledge Interregional collaborations
	<b>Entrepreneurial discovery</b>	<b>2,5</b>	Areas of greatest future potential development Regional entrepreneurial environment assessment Foresight
<b>GOVERNANCE</b>	<b>Quadruple helix engagement</b>	<b>2,5</b>	Collaborative leadership building Boundary spanners Business community involvement
	<b>Governance structure definition</b>	<b>2,5</b>	Steering group Management team Working group
	<b>Multi-fund approach</b>	<b>2,5</b>	RIS3 budgeting Technical assistance funding National and RIS3 policy alignment
<b>OVERALL VISION FOR THE FUTURE OF THE REGION</b>	<b>Depict a regional scenario</b>	<b>2,5</b>	Identification of regional features Regional international perspective Connectivity degree
	<b>Create a common and clear vision of the region</b>	<b>2,5</b>	Mobilising power Renewal and transformational path Meeting social challenges
	<b>Communication strategies</b>	<b>2,5</b>	Definition of goals Identification of target groups Definition of communication tools
<b>IDENTIFICATION OF PRIORITIES</b>	<b>Innovation and research priorities</b>	<b>2,5</b>	Learning from the past Highest potential impact analysis Concrete and achievable objectives
	<b>Development of priorities areas</b>	<b>2,5</b>	Cross-sectoral priorities Horizontal priorities Priority areas presentation
	<b>Innovation delivery instruments</b>	<b>2,5</b>	KETs and Digital agenda Cultural and creative industries and innovative public procurement Green growth and social innovation
<b>DEFINITION OF POLICY MIX AND ACTION PLAN</b>	<b>Composition of the policy mix</b>	<b>2,5</b>	Traditional, emerging and experimental instruments Knowledge generation, diffusion and exploitation Global, regional or individual target
	<b>Action plan</b>	<b>2,5</b>	Definition of strategic objectives Definition of actors involved and targets Definition of timeframes
	<b>Pilot project</b>	<b>2,5</b>	Definition of the project Relevance with respect to RIS3 priorities Expected impact
<b>MONITORING AND EVALUATION</b>	<b>Indicators</b>	<b>2,5</b>	Result indicators Context indicators Output indicators
	<b>Objective and expected results</b>	<b>2,5</b>	Programme aims Outputs Short, medium, long-term results
	<b>RIS3 update</b>	<b>2,5</b>	Monitoring framework Peer review Orientation
<b>ARITHMETIC MEAN</b>	<b>2,50</b>		
<b>ST. DEVIATION</b>	<b>0,00</b>		
<b>WEIGHTED MEAN</b>	<b>2,50</b>		

Source: “Assessing Smart Specialisation Strategies: a threefold method applied to The Basque Country’s RIS3” by Filippo Ferrarini, Section 2.3.4.

As it is possible to notice in the figure, in this case the standard deviation equals to '0', since all the marks have the same value. The situation is different for strategy B, in Figure 1.9.

**Table 1.9 – Assessment Wheel 2.0 and Standard Deviation, Strategy B**

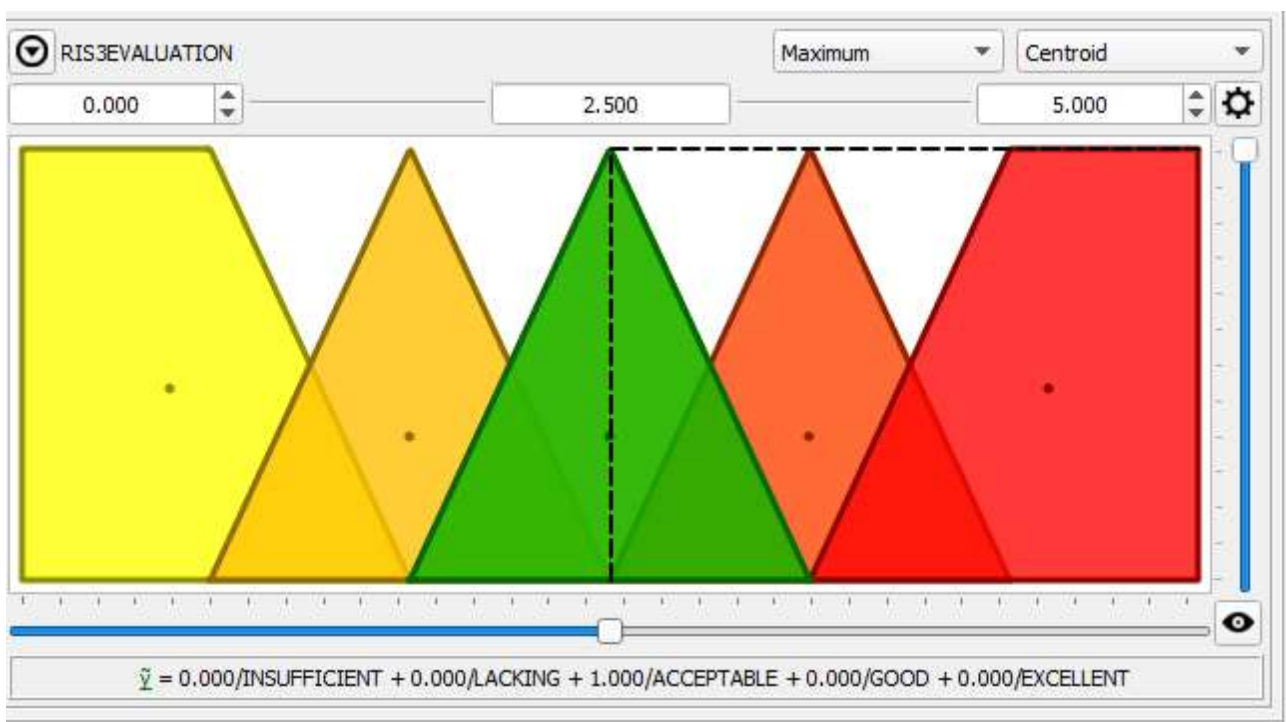
<b>RIS3 Assessment Wheel 2.0 - Strategy B</b>		<b>Insert marks between 0 and 5 in this column (half points i.e. 3,5 are possible)</b>	<b>The structure of this table is taken from the original Assessment Wheel, developed by Christian Saubliens, and modified by Filippo Damiani and Filippo Ferrarini based on the guidelines in the RIS3 Guide and in the Online S3.</b>
<b>RIS3 Steps</b>	<b>Priority Areas</b>	<b>Marks</b>	<b>Topics</b>
<b>REGIONAL CONTEXT AND POTENTIAL FOR INNOVATION</b>	<b>Regional assets</b>	<b>5</b>	Regional context assessment Related variety analysis Differentiation patterns
	<b>Beyond regional boundaries</b>	<b>0</b>	Position of the region within the European and global economy Linkages of flows of goods, services and knowledge Interregional collaborations
	<b>Entrepreneurial discovery</b>	<b>5</b>	Areas of greatest future potential development Regional entrepreneurial environment assessment Foresight
<b>GOVERNANCE</b>	<b>Quadruple helix engagement</b>	<b>0</b>	Collaborative leadership building Boundary spanners Business community involvement
	<b>Governance structure definition</b>	<b>5</b>	Steering group Management team Working group
	<b>Multi-fund approach</b>	<b>0</b>	RIS3 budgeting Technical assistance funding National and RIS3 policy alignment
<b>OVERALL VISION FOR THE FUTURE OF THE REGION</b>	<b>Depict a regional scenario</b>	<b>5</b>	Identification of regional features Regional international perspective Connectivity degree
	<b>Create a common and clear vision of the region</b>	<b>0</b>	Mobilising power Renewal and transformational path Meeting social challenges
	<b>Communication strategies</b>	<b>5</b>	Definition of goals Identification of target groups Definition of communication tools
<b>IDENTIFICATION OF PRIORITIES</b>	<b>Innovation and research priorities</b>	<b>0</b>	Learning from the past Highest potential impact analysis Concrete and achievable objectives
	<b>Development of priorities areas</b>	<b>5</b>	Cross-sectoral priorities Horizontal priorities Priority areas presentation
	<b>Innovation delivery instruments</b>	<b>0</b>	KETs and Digital agenda Cultural and creative industries and innovative public procurement Green growth and social innovation
<b>DEFINITION OF POLICY MIX AND ACTION PLAN</b>	<b>Composition of the policy mix</b>	<b>5</b>	Traditional, emerging and experimental instruments Knowledge generation, diffusion and exploitation Global, regional or individual target
	<b>Action plan</b>	<b>0</b>	Definition of strategic objectives Definition of actors involved and targets Definition of timeframes
	<b>Pilot project</b>	<b>5</b>	Definition of the project Relevance with respect to RIS3 priorities Expected impact
<b>MONITORING AND EVALUATION</b>	<b>Indicators</b>	<b>0</b>	Result indicators Context indicators Output indicators
	<b>Objective and expected results</b>	<b>5</b>	Programme aims Outputs Short, medium, long-term results
	<b>RIS3 update</b>	<b>0</b>	Monitoring framework Peer review Orientation
<b>ARITHMETIC MEAN</b>	<b>2,50</b>		
<b>ST. DEVIATION</b>	<b>2,57</b>		
<b>WEIGHTED MEAN</b>	<b>1,99</b>		

Source: “Assessing Smart Specialisation Strategies: a threefold method applied to The Basque Country’s RIS3” by Filippo Ferrarini, Section 2.3.4.

In this case, the standard deviation is high (in the Assessment Wheel 2.0, this would be the higher possible value of standard deviation), hence the ‘weighted mean’ of this strategy is worse than the ‘weighted mean’ of Strategy A. Therefore, in the case where we had to compare these two strategies, we would say that strategy A is more effective than strategy B, even if they present the same arithmetic mean, since the level of dispersion in strategy B is higher than the one in strategy A. In the Research and Innovation Strategy for Smart Specialisation, to realise a homogeneous strategy is important because of all the priority areas must be developed equally. Therefore, if we were in the shoes of a policy maker, we would say that the strategy of Region A is more consistent and more effective, and this could have consequences on the final results of the strategy itself.

Regarding the assessment through the Fuzzy Logic method, which gives us an idea of the magnitude of the RIS3, the result of strategy A would appear as it is showed in figure 1.7 below.

**Figure 1.7 – Fuzzy Logic, Strategy A**



Source: “Assessing Smart Specialisation Strategies: a threefold method applied to The Basque Country’s RIS3” by Filippo Ferrarini, Section 2.3.4.

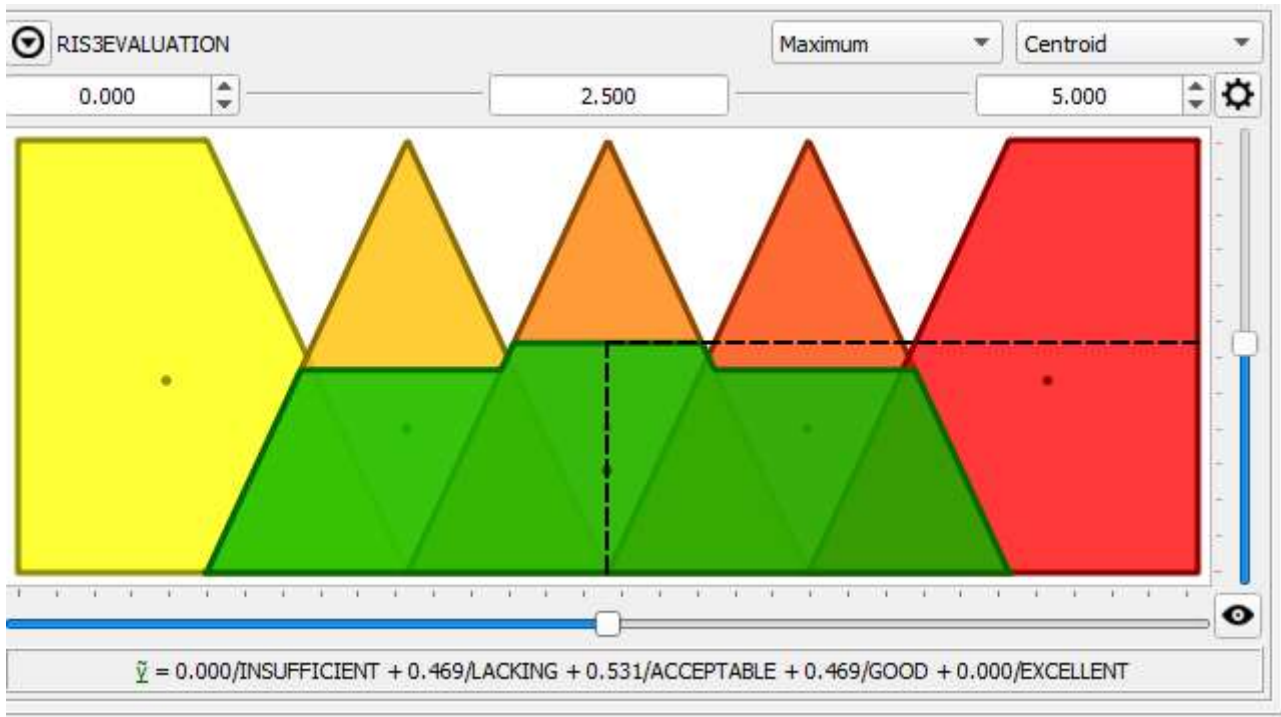
In analysing the figure, note that the result of the defuzzification process is ‘Acceptable’ with a membership grade of ‘1’, which is the maximum possible value. This means that on 729 different



rules, just one has been activated. Hence, we can say the strategy is considered undoubtedly ‘Acceptable’.

On the other hand, the assessment of strategy B would appear as it showed in figure 1.8

**Figure 1.8 – Fuzzy Logic, Strategy B**



Source: “Assessing Smart Specialisation Strategies: a threefold method applied to The Basque Country’s RIS3” by Filippo Ferrarini, Section 2.3.4.

On the contrary, for strategy B the situation is different. In this case the rules that have been activated are 64 over 729, and the final evaluation is more complex: it is ‘Acceptable’ with a membership grade of 0.531, but also ‘Lacking’ and ‘Good’, both with a membership grade of 0.469. The shortage of homogeneity in strategy B could lead to different results: on the one hand, it could produce acceptable or good outcomes, but, on the other hand, it could also have negative effects due to the fact that some parts of the strategy have not been developed at all. This is the reason why we think that the Fuzzy Logic can provide an overview of the grade of probability that a strategy could achieve the expected goals.

In conclusion, the combination of these different methods helps us to measure the effectiveness of the strategy from different angles.

## **Chapter 2 – The RIS3 of The Basque Country**

Key words: The Basque Country, RIS3, Assessment, Strategy, Regional overview, Spider graph, Fuzzy logic

The Basque Country has been chosen as first region in which carrying out the assessment of the RIS3. The decision is related to my personal experience as an Erasmus student in the University of The Basque Country UPV-EHU during the academic year 2016/2017, where I attended a Masters' programme in Business Management.

This chapter is formed as following: in section 2.1 a brief overview of the region considering population, education and economy is presented. Then, in section 2.2 the structure of its Smart Specialisation Strategy is described. Finally, in section 2.3 the assessment of the RIS3 by using the threefold method will be provided.

### **2.1 The Basque Country: an overview**

The region of The Basque Country is one of the most dynamic regions in Spain. Its centenary history, its population, language, culture and traditions, the commitment of its central government and the strong sense of community have played a crucial role in its renewal path, drawing the attention of multiple researchers. The Basque Country is the region that could most successfully transform its economy and society, thanks to active industrial policies, territorial strategies and regional administration.

In accordance with the report of The Basque Institute of Competitiveness “Smart Specialisation Strategies: The Case of The Basque Country”, the success of The Basque economic revolution comes from three different phases, which go from the constitution of the statue of autonomy in 1978, to present.

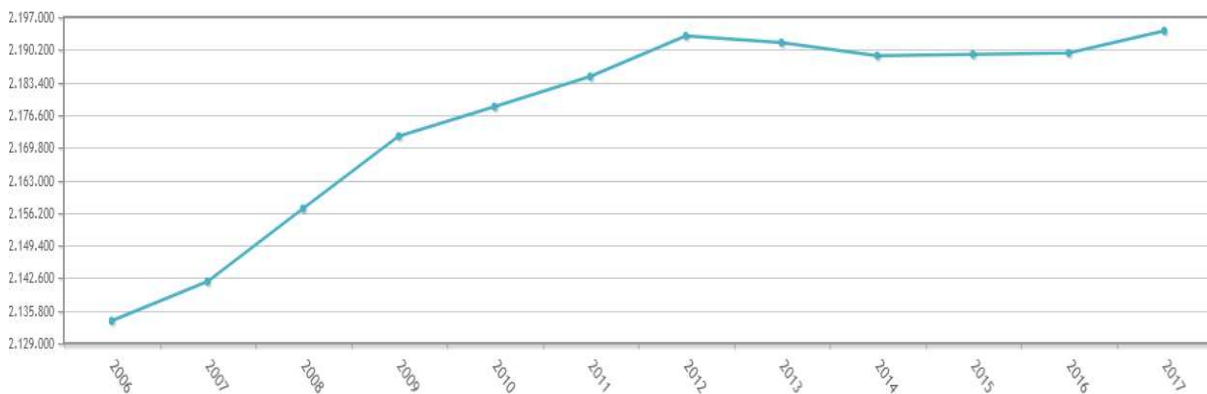
The first period (1980-1990) saw a strong commitment on the part of The Basque government to maintain and support its traditional business and industries. The second period (1991-1998) was a transitional period whose most notable policies were aimed at pioneering and clustering. The third period (1999 to the present) is a period that continues comprehensive plans designed through a participatory process which “pursue the transformation of The Basque economy from a competitive stage based on efficiency to one based on innovation.” (Arancegui, Querejeta, & Montero, 2011)

The Basque Country with an area of 7,230 km<sup>2</sup> and a population of 2,194,158 inhabitants (Instituto Nacional de Estadística, 2018) is one of the smallest seventeenth autonomous communities in Spain, but also one of the wealthiest, with a per capita GDP of 31,805 euro, which is the second highest in the country (after the community of Madrid), and it is above the national (24,100 euro) and EU's average (29,121 euro). The overall regional yearly GDP is about 68,897 million euro. (European Commission, 2018a)

The Basque Country is located in the north-east of Spain, and its borders are shared with Cantabria and the province of Burgos in the west, the Cantabrian Sea in the north, France and Navarra in the east, and La Rioja in the south. The region is formed by three provinces, Araba, which capital Victoria-Gasteiz is also the capital of the region, Gipuzkoa, which capital is Donostia - San Sebastian that holds the highest number of Michelin stars per square meter, and Bizkaia, which capital is Bilbao, the largest in population with more than 350,000 inhabitants.

As figure 2.1 shows, the population of The Basque Country has been growing in the last ten years, passing from 2,133,684 people in 2006 to 2,194,158 in 2017. ('Instituto Nacional de Estadística', 2018)

**Figure 2. 1 Basque Country population trend (2006-2017)**



Source: 'Instituto Nacional de Estadística', 2018.

However, the current situation shows a drop in the birth rate of the community, which is more than halved in the last forty years (see figure 2.2), seeing in Gipuzkoa the most affected province in the region.

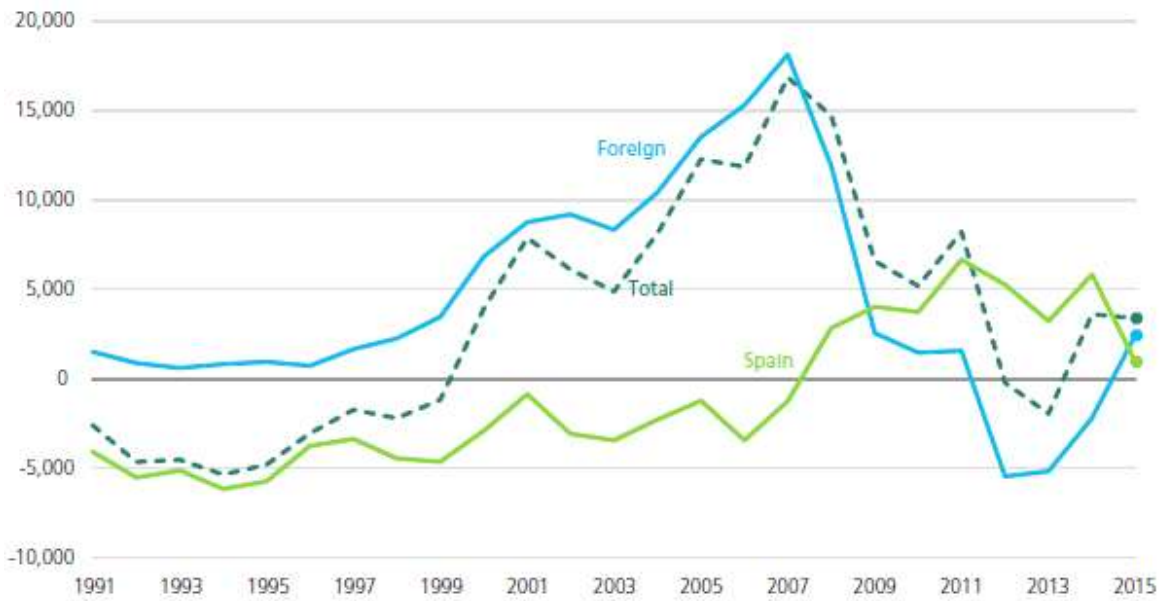
**Figure 2.2- Basque Country birth trend (1975-2016)**

	EUSKALAE C.A. DE EUSKADI		ARABA ÁLAVA		BIZKAIA		GIPUZKOA	
	Jaiok Nacidos	Tasa ‰	Jaiok Nacidos	Tasa ‰	Jaiok Nacidos	Tasa ‰	Jaiok Nacidos	Tasa ‰
1975	39.646	19,1	4.833	20,4	22.075	19,1	12.738	18,7
1980	28.812	13,5	3.917	15,3	16.569	13,9	8.326	12,0
1985	20.970	9,8	3.008	11,2	11.582	9,8	6.380	9,2
1990	16.361	7,8	2.290	8,4	8.724	7,5	5.347	7,9
1995	15.322	7,3	2.082	7,4	7.879	6,9	5.361	7,9
2000	17.316	8,3	2.487	8,8	8.818	7,9	6.011	8,9
2005	19.715	9,3	2.792	9,3	10.122	9,0	6.801	9,9
2010	21.159	9,7	3.346	10,5	10.598	9,2	7.215	10,3
2011(a)	21.180	9,7	3.429	10,7	10.687	9,0	7.064	10,0
2012(a)	20.533	9,4	3.293	10,3	10.342	9,0	6.898	9,8
2013(a)	19.118	8,8	3.099	9,7	9.732	8,5	6.287	8,9
2014(a)	19.378	8,9	3.277	10,3	9.740	8,5	6.361	9,0
2015(a)	18.851	8,7	3.159	9,8	9.331	8,2	6.361	9,0
2016(p)	18.204	-	3.073	-	9.148	-	5.983	-

Source: “Instituto Vasco de Estadística 2017”, page 10.

The descent parabola of birth rate is counterbalanced by a positive migration flow. The Basque Country has become in recent years a recipient from migrants, coming primarily from other countries and secondly from Spain. Figure 2.3 shows a positive migration trend from 1991 to 2015. The positive peak on 2007-2008 had a bitter slope associated with the crisis of Europe, however, due to the composition of The Basque economy, strongly manufacturing-based, its adverse effects were slightly softened, causing the negative migration trend to have less impact.

**Figure 2.3 – Basque Country migration flows (1991-2015)**

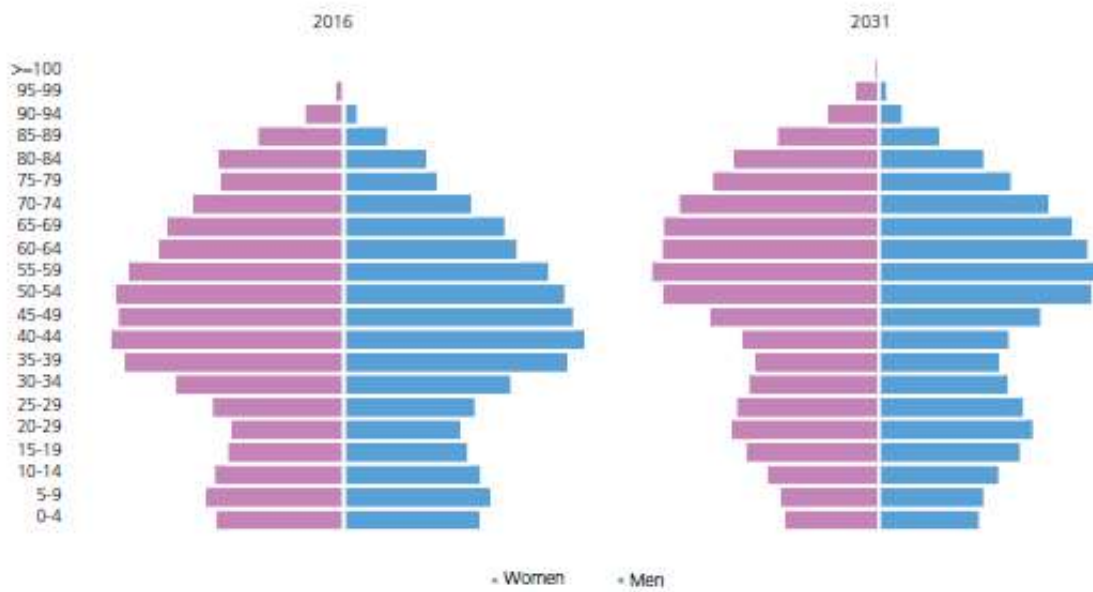


Source: “The Basque Country Competitiveness Report 2017”, page 50.

With regard to the composition of the population, the projections present a raise in the percentage of people above 65 (see figure 2.4) now accounted for 21%, with an accentuation in the nearby future, with an estimation in 2031 of 29% of people over 65 and a percentage of people in working age at 58% (The Basque Country Competitiveness Report, 2017 pages 48-49).

This tendency may have repercussion on the labour market and the labour force, as well as on retirement services and society needs.

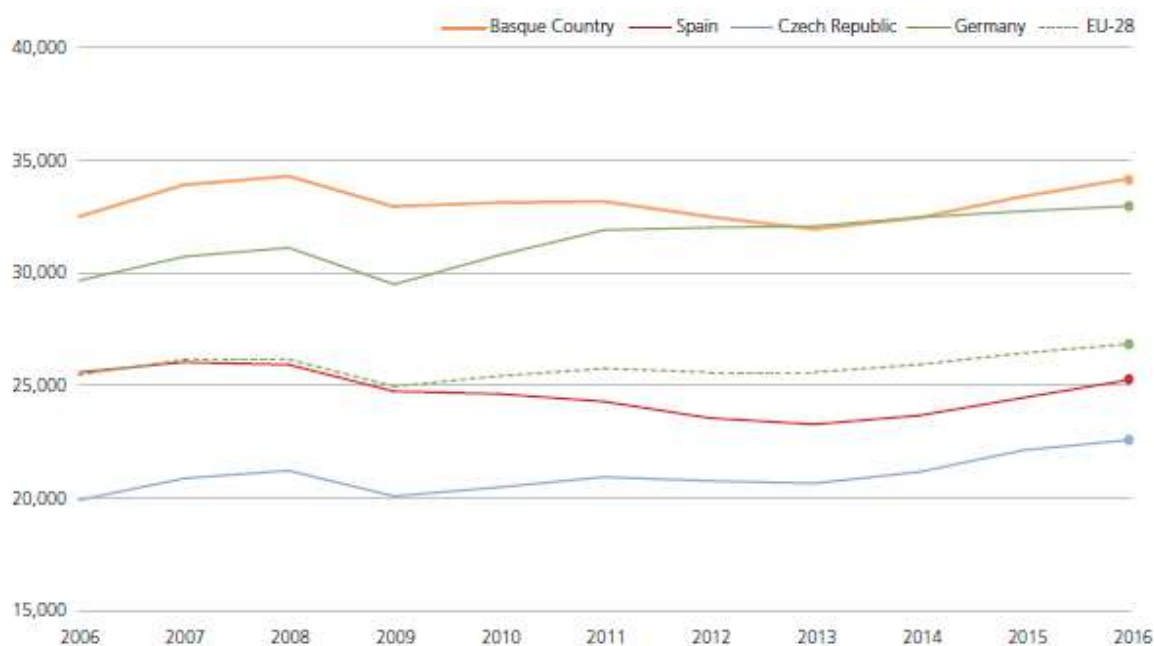
**Figure 2.4 - Basque Country current and projected composition of the population (2016-2031)**



Source: “The Basque Country Competitiveness Report 2017”, page 49.

The Basque Country has a strong manufacturing-based economy, and it is one of the most important industrial concentrations in Spain and Europe. As described at the beginning of this section, The Basque Country has a per capita GDP of 31,805 euro, which is the second highest for the country (after the community of Madrid), and it is far above the average of Spain (24,100 euro) and EU’s average (29,121 euro), as displayed by figure 2.5. In the figure it is possible to see how The Basque’s per capita GDP (first line from above) is far higher than Spain’s per capita GDP and Europe’s one. Moreover, it is also higher than Germany’s per capita GDP. That shows the significance of the wealth of the region.

**Figure 2.5 - Per capita GDP's variation (2006-2016)**



Source: “The Basque Country Competitiveness Report 2017”, page 44

According to the Regional Innovation Monitor Plus of the European Commission, the composition of the economy generates the 69.2% of the GDP in market prices from services, the 23.89% is generated from industry, and construction and agriculture give respectively the 6.06% and the 0.85%. The unemployment rate in 2016 was 12.3% while Spain had 18.6% and Europe 8.2%.

With respect to research and development, table 2.1 shows a regional R&D expenditure of 1.82% of GDP in 2016, a percentage which is far lower than the aim of 3% defined by the European Union for 2020. In the table it is interesting to notice that the expenditure in R&D in The Basque Country for the period 2010-2016 has changed from 2.04 % in 2010 to 1.82 % in 2016. This means that a contraction in R&D expenditure has occurred. The Basque Country, Spain and Luxemburg have a negative trend, whereas the other countries and the EU have a positive one. Only Germany almost touches the 3% of R&D expenditure, achieving the target of Europe 2020.

**Table 2. 1- R&D expenditure (% of countries' GDP) 2010-2016**

	2010	2011	2012	2013	2014	2015	2016
<b>EU (28)</b>	1.93	1.97	2.01	2.02	2.03	2,03	2,03
<b>Germany</b>	2.71	2.80	2.87	2.82	2.87	2.92	2.94
<b>Spain</b>	1.35	1.33	1.29	1.27	1.24	1.22	1.19
<b>Italy</b>	1.22	1.21	1.27	1.31	1.34	1.34	1.29
<b>Luxemburg</b>	1.50	1.46	1.27	1.30	1.26	1.27	1.24
<b>United Kingdom</b>	1.67	1.67	1.60	1.65	1.67	1.67	1.69
<b>Basque Country</b>	2.04	2.04	2.09	2.03	1.94	1.86	1.82

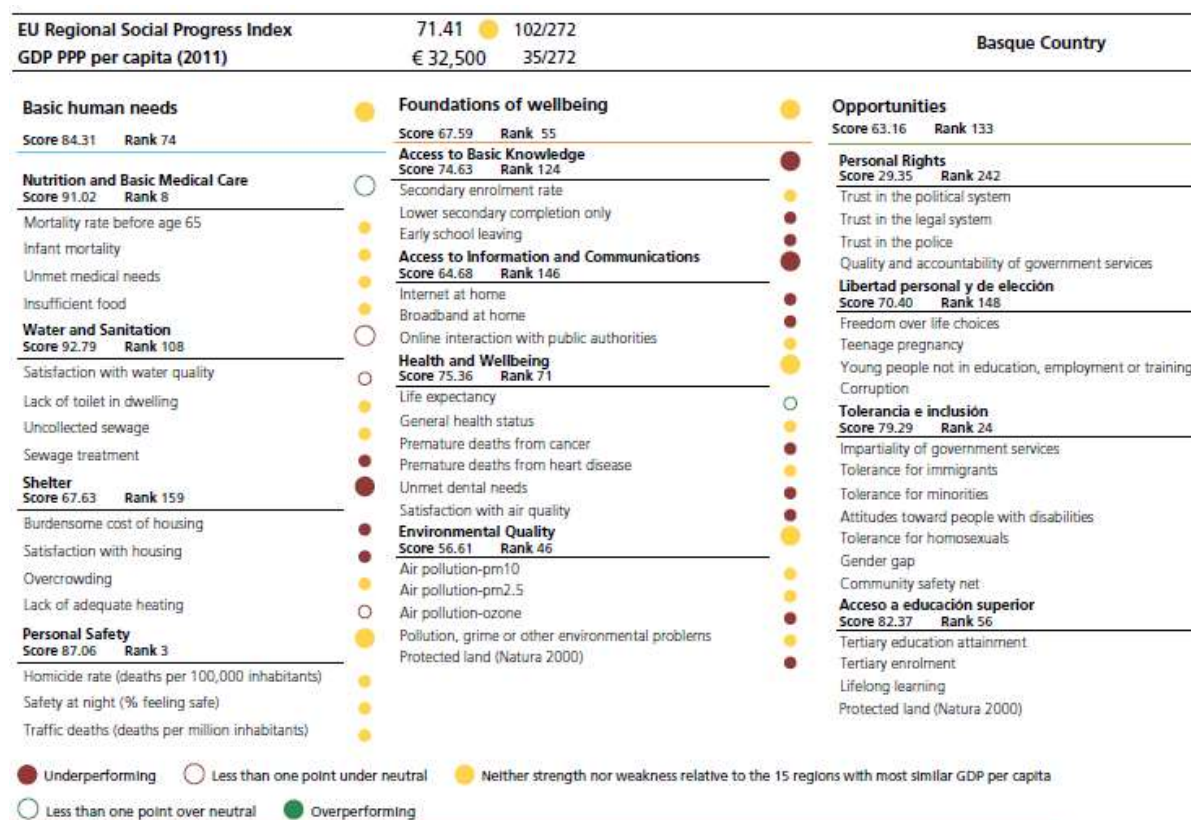
Source: 'Eustat' – Editing and translation from Spanish by the author

Regional Innovation Scoreboard 2017 classifies The Basque Country as strong innovator with a score of 91.4, considering a score of 0.280 in EPO patent application, 0.432 in scientific co-publication and 0.352 in product or process innovators. (see database European Commission, 2017)

On the side of the wellbeing, The Basque Country is ranked by the European Social Progress Index, which aims to measure social progress for each region by following the framework of the global Social Progress Index which is made up of three dimensions such as basic human needs, foundations of wellbeing and opportunity, among the best ranked Spanish regions, scoring 102 on 272. In figure 2.6 it is possible to see that The Basque Country is above the average in the majority of indicators, with a high performance in 'tolerance and inclusion' (24/272), 'personal safety' (3/272), 'nutrition and medical care' (8/272) and 'per capita GDP' (35/272). Nevertheless, the region has some weaknesses in relation with 'personal rights' (242/272), 'shelter' (159/272) and 'personal freedom' (148/272).



Figure 2.6 - European Social Progress Index for The Basque Country



Source: “The Basque Country Competitiveness Report 2017”, page 65

## 2.2 The Basque Country’s RIS3

The Smart Specialisation Strategy of The Basque County, called “PCTI EUSKADI 2020 – Una estrategia de especialización inteligente” is a 169 pages document, published the 15th of December of 2014 by the Consejo Vasco de Ciencia, Tecnología e Innovación of The Basque Country. Its purpose is “to apply more innovation to research, increasing cooperation between the world of science and the business world to guide the R & D & I activity to results”(Basque Government, 2014). The strategy is aligned with the Europe 2020 strategy and Horizon 2020 and it comes as the evolution stage of the scientific-technological policy of The Basque Country.

The elaboration of the PCTI Euskadi 2020 was developed following three different phases:

1. Definition of the RIS3 strategy for The Basque Country.
2. Formulation of the basic principles of the new PCTI Euskadi 2020.

### 3. Elaboration, contrast and validation of the document of the new plan.

By using the Eye@RIS3 tool of the Smart Specialisation Platform, it is possible to visualize the RIS3 priorities of the different regions. In the case of The Basque Country its relative priorities, even considering their economic and scientific domains, as well as the respective policy objectives, are presented in table 2.2 below.

The first priority, Cultural and Creative Industries, covers 15 sub-sectors such as videogames, audio-visual, visual-marketing, editing and crafts. The second one, which is Food, it is divided in six lines of action:

- Healthy Food, that aims to increase the population health state.
- New Food Production Systems, that aims to develop new technologies related with food.
- New Gastronomic development for special society groups.
- Safe and quality food – new technology conservation.
- Integration of ICT technologies in the food production process.
- Food post production stage initiatives.

The Environmental Ecosystem priority is divided in two blocks. The first one works on the circular economy: green products and businesses, appraisal of residuals, and cleaner technologies and processes. The second block operates for the preservation of the territory: water and soil recuperation, adaptation to the climate change, and eco-system services.

The Bioscience-health priority works along four areas, such as rare diseases, personalised medicine, equipment and ICT, big data. Advanced manufacturing aims to the Industry 4.0, therefore it is focused on intelligent manufacturing, intelligent capability development network, circular economy, advanced services 4.0.

Sustainable energy has established eleventh initiatives, some of them are floating offshore, storage systems for electric networks, thermal storage solutions, and integrated systems living lab. Finally, the last priority, Urban Habitat, aims to urban regeneration, the creation of new materials for the sustainable construction, improve the living condition in the urban areas, modernise the industrial construction processes. ('País Vasco title - Smart Specialisation Platform')

**Table 2. 2 - The Basque Country Smart Specialisation priorities**

<b>Priority</b>	<b>Economic Domain</b>	<b>Scientific Domain</b>	<b>Policy Objective</b>
<b>Cultural and Creative Industries</b>	Arts, entertainment and recreation	Culture, recreation, religion and mass media	Cultural and creative industries
<b>Food</b>	Manufacturing Accommodation and food service activities. Professional, scientific and technical activities	Industrial production and technology. Agriculture.	Public health & security Service innovation
<b>Environmental Ecosystems</b>	Water supply; sewerage; waste management and remediation activities	Environment. Transport, telecommunication Energy. Industrial production and technology.	Sustainable innovation
<b>Biosciences-Health</b>	Information and communication technologies Other professional, scientific and technical activities.	Health Political and social systems, structures and processes General advancement of knowledge.	Digital transformation Public health & security
<b>Advanced Manufacturing</b>	Manufacturing	Energy Industrial production and technology	Blue growth KETs
<b>Sustainable Energy</b>	Electricity, gas, steam and air conditioning supply	Energy consumption, distribution and storage	Blue growth. Sustainable innovation
<b>Urban Habitat</b>	Construction. Professional, scientific and technical activities	Transport, telecommunication.	KETs Sustainable innovation

Source: 'Eye@RIS3- Smart Specialisation Platform '. Table elaborated by the author.

Moreover, along with PCTI Euskadi 2020, The Basque Government has embarked initiatives for the governmental strategic planning which aims to underpin the Smart Specialisation. Among them it is worthwhile to underline the “Plan de Industrialización 2014-2016” that is directed to the support of the region’s re-industrialisation; the “Estrategia Marco de Internacionalización 2020” which bolsters the internationalisation of the companies and the country; the “IV Programa Marco Ambiental de Euskadi 2020”, that helps to the environment conservation and protection; the “Plan de Salud 2013-2020”, which orients the health actions of The Basque Government; the “Plan Universitario 2015-2018”, which aims to strengthen the role of the universities and their connection with the industrial fabric.

The Institute for Competitiveness of The Basque Country publicized a mid-term RIS3 report in June 2016 called “Implementing RIS3 – the Case of The Basque Country”, in which the most significant developments of the on-going implementation phase of The Basque RIS3 are analyzed. The report is based on interviews of 35 people from government, business, and research agencies that are involved in the RIS3 process. In a nutshell, it can be said that since the RIS3 has been implemented, the initial plan has been re-designed by two main features. Firstly, it has provoked a process of deepening in the governance mechanisms, with the constitutions of new supportive governance structures, a more distributed leadership at operational level, a grater cross-departmental coordination and a stronger multilevel coordination. Secondly, it has been stimulated the entrepreneurial discovery through the establishment of seven steering groups which correspond to the three keys priorities and the fours opportunity niches.

### **2.3 The Basque Country’s RIS3 assessment**

In this part, the assessment of The Basque Country RIS3 is carried out. Following the pattern of the threefold assessment method, each step will be evaluated according with the tables created. During the analysis of the priority areas the “Topics” and the “Tools” will be considered. The combination of the latter and the former will be helpful for skimming and scanning the strategy in a smooth and easy way. The results will be then displayed in six tables, which contain the “Priority area”, the “RIS3 references”, the “Marks” and the “Comments”. Successively it will be created a main table, where the arithmetic mean, the standard deviation and the weighted mean will be calculated. Furthermore, below, the same the spider-graph will be generated. In the last part, the fuzzy logic

method will be applied and the result will be commented. Final consideration will be provided at the end.

**Table 2.3 – STEP 1 Regional context and potential of innovation**

Priority area	RIS3 references	Marks	Comments
<b>Regional assets</b>	Pages: 20-28;36-38;48-50;137-157 and RIS3 Euskadi	5	Good regional context assessment. The region provides a good analysis about the economical and societal features of the region, which is often described within the E.U. and Spanish context. The SWOT analysis is really well done. There is a detailed explanation about the weaknesses of the region, such as lacks of the innovative system. In addition, the region displays the main indicators regarding the economic, societal and innovative situation of the region. The asset mapping is good. The economic specialisation indexes are reported. Regarding the main research infrastructure and enterprises, the region present a long list of actors. Moreover, it categorizes them in relation with the knowledge generated, for example “tech developer” or “support and application” actors. The strategy lists a wide range of different actors, considering cluster, financial actors, universities, technology centres, laboratories and enterprises. In addition, the strategy well describes the mission and the activities performed by each macro-category of actors. Moreover, the region provides detailed information regarding the level of specialisation of the actors involved, the level of research activity and others indicators such as R&D expenditure. Furthermore, it describes the well-established activities by considering the specialisation indexes and the sectors that have more influence on the GDP
<b>Beyond regional boundaries</b>	Pages: 21-23; 62-63;93-94;101;143-152 and RIS3 Euskadi	4,5	The region provides a good benchmarking analysis with respect to European regions. The SWOT highlights and describes the weaknesses by analyzing the competitive position of the region, considering the patent activity, the scientific production, the R&D expenditure and other indexes. Identified precise actors and cooperative research centres, which foster cooperation activities between private and public, and personnel and researchers mobility. The specialisation indexes are well displayed and analyzed. There is a star graph which analyzes the level of scientific specialisation of the region. There is an

			high grade of analysis with respect to main specialisation indicators: import/export, competitive position, R&D expenditure innovation rate.
<b>Entrepreneurial discovery</b>	Pages: 24-28; 36-38;143-152 and RIS3 Euskadi	5	The entrepreneurial discovery process of the region is twofold. On the one hand, the region provides a very well detailed synthesis of the contributions made during the meeting held for the definition of the strategic priorities. The involvement of the actors is high and there is a great description of the discovery path and information exchange among partners. Moreover, the strategy provides the resume to key questions which synthesize and define the overall EDP. On the other hand, the region carries out the EDP through a deep analysis of the main sectors of excellence and competitive advantage of the region by defining and describing key criteria for the choices and making an assessment about the technological specialisations of the sectors. The region displays a great analysis of the scientific production indicators regarding R&D, publication citations and patents. The information provided is deep and detailed. Provided foresight studies by expert assessment such as Morgan, as well as OECD studies. The action of foresight is described by the diagnosis made by the SWOT analysis, especially in the explanation of the weaknesses of the region, where the renewal transformation path and possible future developments of the region are identified.

Source: table elaborated by the author

**Table 2.4 – STEP 2 Governance**

<b>Priority area</b>	<b>RIS3 references</b>	<b>Marks</b>	<b>Comments</b>
<b>Quadruple helix engagement</b>	Pages: 12-16;84-99 and RIS3 Euskadi	3,5	There is a good involvement of the quadruple helix in the definition of the strategy. The actors have brought their feedback in the definition of the RIS3's priorities. Delegates of the business community, the public sectors and the research sector are represented. Moreover, in the new composition of the RVCTI network, the region has involved all the bodies that compose it, by defining their missions, tasks and responsibilities within the strategy. There is the presence of boundary spanners. In addition, in the development of the priority areas, the sector champions and the main bodies of the quadruple helix have been selected for the development of each priority area. Nevertheless, there is not much mention about the involvement of the community and users group who have been left aside.
<b>Governance structure definition</b>	Pages: 84-96; 108-113	5	The governance is really well defined. The structure is described and the bodies that compose it are identified. Moreover, their roles, tasks and responsibilities are very well explained. The steering group is The Basque government, whereas the management team is the science technology and innovation committee with the support of other bodies, while the working group is defined through collaborative activities among the actors involved. Each agent that compose the governance is well described. Moreover, there is a focus on the bodies that compose the science, technology and innovation network, where their mission, roles, tasks and financing framework are described.
<b>Multi-fund approach</b>	Pages: 16-19; 119-128	5	There is an excellent analysis of the RIS3 budgeting. The region displays and meticulously describes the budget referred to the RIS3 by analyzing the composition of the funding streams. The region provides the budget timelines from 2014 to 2020. Different budgetary sources such as private financing, Horizon 2020, external and foreign funds are identified. The region makes a foresight and a scenario planning by analyzing the outcome and impact of that the financing activities might have on the different beneficiaries bodies, by also describing the tasks that they have to perform in order to support the strategy. Great alignment between RIS3 objectives and national strategies, such as the



			“Plan de Insutrialización”, “Plan de salud”, “el Marco ambiental”.
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Source: table elaborated by the author

**Table 2.5 – STEP 3 Overall vision for the future of the vision**

Priority area	RIS3 references	Marks	Comments
<b>Depict a regional scenario</b>	Pages: 20-24; 36-38;84-88;143-152 and RIS3 Euskadi	4	The region makes a good depiction of the regional scenario, by describing the competitiveness context, the micro-economic background and the main regional indicators. Therefore, the region identifies its regional features even though the Europe 2020 dimensions are not mentioned. Thanks to the SWOT analysis, the region defines itself in the regional and international perspective, by also underlying the weaknesses identified. Hence, the SWOT's comments point out the need to empower the R&D development potential, the internationalisation and the entrepreneurial innovation. The region can be defined as a knowledge diffusion region, with population inflow, shifting from industrial manufacturing area to knowledge region. Emphasis on knowledge and innovation, as well as on sustainable growth. The region is a population inflow and urban coastal area, passing from cluster building to sustaining momentum in terms of connectivity degree. The region main priority is the creation of knowledge, to becoming a technology hub. Good technology and innovation structure and actors. Clear definition of the strategy, focused mainly to R&D+I.
<b>Create a common and clear vision</b>	Pages:11-19; 40-46; 89-96; 159-160	4	The strategy creates a clear vision about the objectives and mission of the RIS3. The region identifies the project and the dream of the strategy by analyzing the European context and identifying the issues and challenges of the region. The strategy is entwined with the previous regional strategies, in this sense, the renewal transformation path of the region started 30 years before. The focus of the region is improving its current competitive position, the wellness and the economic development. The vision can be resumed in the willing to make become The Basque Country the main innovative area in southern Europe. In this context the region defines the lines of action, among them boost the productive strategies in the priority sectors identified and taking advantage of scientific and technological capabilities and specialisations.
<b>Communication strategies</b>	Pages:132-135; 151-152	2	The region tries to inform and create an attractive image of itself, by also involving external auditors such as Kevin Morgan. Nevertheless, the strategy is lacking with

		<p>respect to communication strategies. The process of RIS3 definition is described without mentioning and describing the activities performed. There is almost no mention about forums, workshops, meetings and community involvement. The RIS3 debate is performed just in the meeting with stakeholders in November 2013. Lacks in the citizenship involvement by observing a sort of indifference of the population about the RIS3. However, no effective communication actions toward possible targeted group is identified. Carried out a survey and measured the citizens involvement on the innovation process made by the region.</p>
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Source: table elaborated by the author

**Table 2.6 – STEP 4 Identification of priorities**

Priority area	RIS3 references	Marks	Comments
<b>Innovation and Research priorities</b>	Pages: 29-35; 47-54; 154-157 and RIS3 Euskadi	4	<p>Good references on past experiences. Re-track of the path bringing to the RIS3 strategy. References taken by the previous PCTI 2015. Analysis of the bets set and global evaluation of the overall performance of the strategy, which comes being the main reference from which the new PCTI 2020 starts from. The region clearly identifies the niches and the priority areas. In addition, it relates the RIS3 priorities within the Horizon 2020 challenges. Regarding the niches, the region makes an assessment on the level of maturity of the sectors where the niches are identified. The region well defines the pattern of identification of priority areas. It chooses them by analyzing the level of knowledge and capabilities in the sectors selected, by considering internal and external demand, and the level of technological intensity. Moreover, it subdivides the agents engaged in the strategy by different level of specialisation. The region makes also an assessment about the R&amp;D expenditure in the different sectors. Therefore, the process of selection of priority areas is grounded on a real critical mass, on possible regional potential and on effective availability of economic agents that can support the strategy.</p>
<b>Development of priority areas</b>	Pages: 53-69;84-85 and RIS3 Euskadi	4	<p>The region identifies four strategic lines of actions and two cross-sectoral priorities. Moreover, it recognises in the gender equality the horizontal priority. The areas are presented with a SWOT analysis, which makes a good assessment of the possible structural change of the region. Each priority area is well developed, taking into account the diversification potential and the key actors involved in the priority areas. Hence, in each line of action the specific goals to be achieved are described. The region makes a sort of context assessment within the development of the priority areas, as well as indicating the strategic actions the region has been carrying out so far. The region makes a good presentation of the priority areas by considering the clusters, the KETs which have been used and the areas of greatest future development. In addition, the strategy makes and assessment about the R&amp;D expenditure in each priority area and the level of specialisation of the actors engaged.</p>

<b>Innovation Delivery Instruments</b>	Pages: 26-27; 31;40;51; 62;65; 67-68; 138; 155- 157	3	<p>The region well describes the KETs used by linking them to the priority areas, the economic niches and the patent activity, which letter lead to new possible economic niches. The Digital agenda and the digital growth is sometimes mentioned in the document, due to the fact that the region has several key actors in this field. However, this area is not been described, hence almost no information is present. Cultural and creative industries are in the agenda of The Basque Country, and they represent a strategic niche. The region identifies sectors and actors involved in this field. Nevertheless, the description about this topic is poor. The innovation of the public sector belongs to the second horizontal priority. The Basque Country considers with importance the innovation of the public sector. However, in the strategy just a little of information is provided, which is mainly contained in the “Public innovation strategic plan.” Social innovation is a cross-sectoral priority, which is supposed to be improved and developed through three different lines of action, in order to make The Basque Country the social innovation centre in Europe. Nevertheless, not much information is available on this topic. Green growth is encompassed in the definition of the priority areas and niches, where the region identifies several sectors which have been performing it, such as sustainable energy and eco innovation. However, the information provided is not that clear and it has to be deduced from the text.</p>
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Source: table elaborated by the author

**Table 2.7 – STEP 5 Definition of policy mix and action plan**

Priority area	RIS3 references	Marks	Comments
<b>Composition of the policy mix</b>	Pages: 101-106 and Instrumentos del Policy mix	5	Absolutely outstanding range of innovation delivery instruments. The region provides an incredible range of instruments in order to carry out the strategy. Each of them is extensively described, considering its purpose, its objectives with respect to the RIS3, the beneficiaries and the duration of the programme in which the instrument operates. Moreover, the category which the instrument belongs and the department responsible for its performance are described. The instruments displayed are more than 50 and the region may count on an absolutely strong framework of actions deployed. There are all kind of instruments (global, regional and individual target instruments; knowledge diffusion, generation and exploitation instruments; traditional, emerging and experimental instruments).
<b>Action Plan</b>	Pages : 69-83 ;	4	The action plan is described in five operative objectives and one horizontal objective. Each strategic objective is identified through a context analysis and the actions the region must take in order to achieve it. In addition, the base line and the relative target is also considered. The timeframes are not defined and just in some objectives the actors involved are indicated. The strategy concentrates its attention on the outcome which the action plan should lead to, in a nut shell a reshape of the RVCTI by deploying a series of different actions. The strategy pauses on the new definition of the RCVTI by also considering and analyzing the single bodies that compose it and their activities, mission and financing sources. The strategy well describes the main actions the region is going to perform by considering the actors, the targets, and the strategic objectives. The action plan is well depicted.
<b>Pilot projects</b>	Pages: 98; 112	1	Briefly mention of a pilot project, which refers to the development of new products and services. Need to foster these type of activities. However, no reliable evidence with respect to this priority area is provided.

Source: table elaborated by the author

**Table 2.8 – STEP 6 Monitoring and evaluation**

Priority area	RIS3 references	Marks	Comments
<b>Indicators</b>	Pages:70-83; 116-117; 137	3,5	Context indicators are listed in the annexes whereas results indicators are described in the action plan. There is no explanation about their meaning , however the results indicators are excellently described. They are contained in the definition of the action plan and for each of them, the context which they refer to is explained. Moreover, it is also described their composition and collecting modality. Even though results indicators are well described, the output indicators are not. In addition, the letter are few. The baseline value and the 2023 target are reported.
<b>Objective and expected results</b>	Pages:114-115; 118-121	3	No presence of intervention logic. The information provided is on average. The outputs which are the yearly reports are indicated. The programme aim is defined just in medium term, even though the financing activity is defined in short, medium and long term. The strategy describes the possible outputs the monitoring and evaluation activities might lead to as well as the necessity to establish an integrated monitoring plan.
<b>RIS3 update</b>	Pages : 53-54 ; 114-115 ; 119-120 ; 159-160 and Peer-review	3,5	The monitoring framework has different stages, which are the strategy evaluation, the instrument evaluation, the RVCTI agents evaluation, the tech innovation evaluation. The bodies responsible for the monitoring activity are defined, which in some circumstances it involves external expert. No social media analysis are indicated. Use of balance scorecard by mentioning qualitative and quantitative monitoring strategies. Presence of the Peer review, elaborated the 31th of January of 2012. Definition of the outward and future orientation.

Source: table elaborated by the author

**Table 2.9 – RIS3 Assessment Wheel 2.0 applied to The Basque Country’s RIS3 – Table**

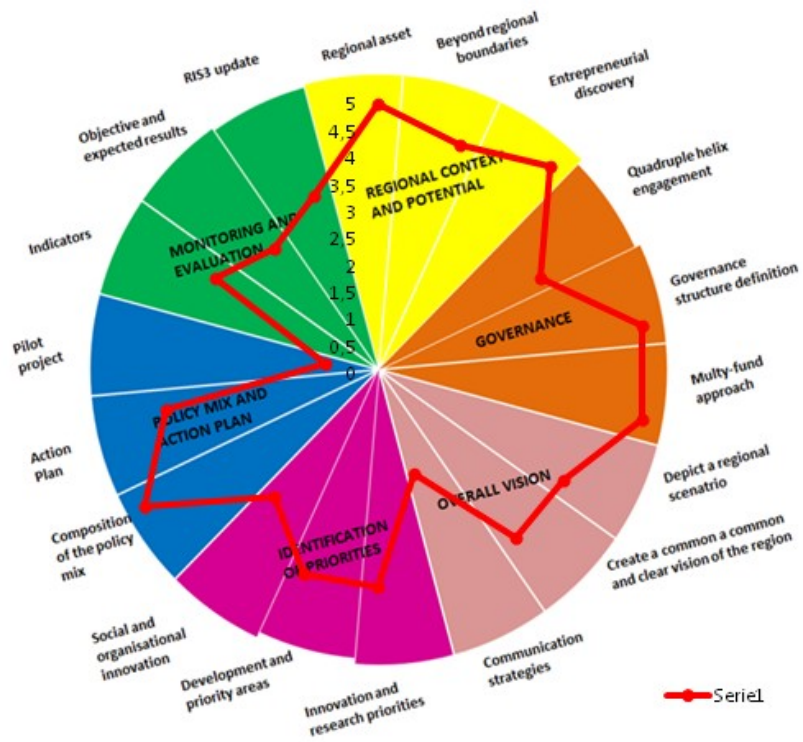
<b>RIS3 Assessment Wheel 2.0 - The Basque Country</b>		<b>Insert marks between 0 and 5 in this column (half points i.e. 3,5 are possible)</b>	<b>The structure of this table is taken from the original Assessment Wheel, developed by Christian Saubliens, and modified by Filippo Damiani and Filippo Ferrarini based on the guidelines in the RIS3 Guide and in the Online S3.</b>
<b>RIS3 Steps</b>	<b>Priority Areas</b>	<b>Marks</b>	<b>Topics</b>
<b>REGIONAL CONTEXT AND POTENTIAL FOR INNOVATION</b>	<b>Regional assets</b>	<b>5</b>	Regional context assessment Related variety analysis Differentiation patterns
	<b>Beyond regional boundaries</b>	<b>4,5</b>	Position of the region within the European and global economy Linkages of flows of goods, services and knowledge Interregional collaborations
	<b>Entrepreneurial discovery</b>	<b>5</b>	Areas of greatest future potential development Regional entrepreneurial environment assessment Foresight
<b>GOVERNANCE</b>	<b>Quadruple helix engagement</b>	<b>3,5</b>	Collaborative leadership building Boundary spanners Business community involvement
	<b>Governance structure definition</b>	<b>5</b>	Steering group Management team Working group
	<b>Multi-fund approach</b>	<b>5</b>	RIS3 budgeting Technical assistance funding National and RIS3 policy alignment
<b>OVERALL VISION FOR THE FUTURE OF THE REGION</b>	<b>Depict a regional scenario</b>	<b>4</b>	Identification of regional features Regional international perspective Connectivity degree
	<b>Create a common and clear vision of the region</b>	<b>4</b>	Mobilising power Renewal and transformational path Meeting social challenges
	<b>Communication strategies</b>	<b>2</b>	Definition of goals Identification of target groups Definition of communication tools
<b>IDENTIFICATION OF PRIORITIES</b>	<b>Innovation and research priorities</b>	<b>4</b>	Learning from the past Highest potential impact analysis Concrete and achievable objectives
	<b>Development of priorities areas</b>	<b>4</b>	Cross-sectoral priorities Horizontal priorities Priority areas presentation
	<b>Innovation delivery instruments</b>	<b>3</b>	KETs and Digital agenda Cultural and creative industries and innovative public procurement Green growth and social innovation
<b>DEFINITION OF POLICY MIX AND ACTION PLAN</b>	<b>Composition of the policy mix</b>	<b>5</b>	Traditional, emerging and experimental instruments Knowledge generation, diffusion and exploitation Global, regional or individual target
	<b>Action plan</b>	<b>4</b>	Definition of strategic objectives Definition of actors involved and targets Definition of timeframes
	<b>Pilot project</b>	<b>1</b>	Definition of the project Relevance with respect to RIS3 priorities Expected impact
<b>MONITORING AND EVALUATION</b>	<b>Indicators</b>	<b>3,5</b>	Result indicators Context indicators Output indicators
	<b>Objective and expected results</b>	<b>3</b>	Programme aims Outputs Short, medium, long-term results
	<b>RIS3 update</b>	<b>3,5</b>	Monitoring framework Peer review Orientation
<b>ARITHMETIC MEAN</b>		<b>3,83</b>	
<b>ST. DEVIATION</b>		<b>1,10</b>	
<b>WEIGHTED MEAN</b>		<b>3,61</b>	

Source: table elaborated by the author



Looking at table 2.9, it is possible to notice that the standard deviation is 1.10. There is little difference between the arithmetic mean and the weighted mean, the former scores 3.83 and the latter scores 3.61. This means that the composition of marks is quite homogeneous, moreover the average score is pretty high, which means a good strategy design.

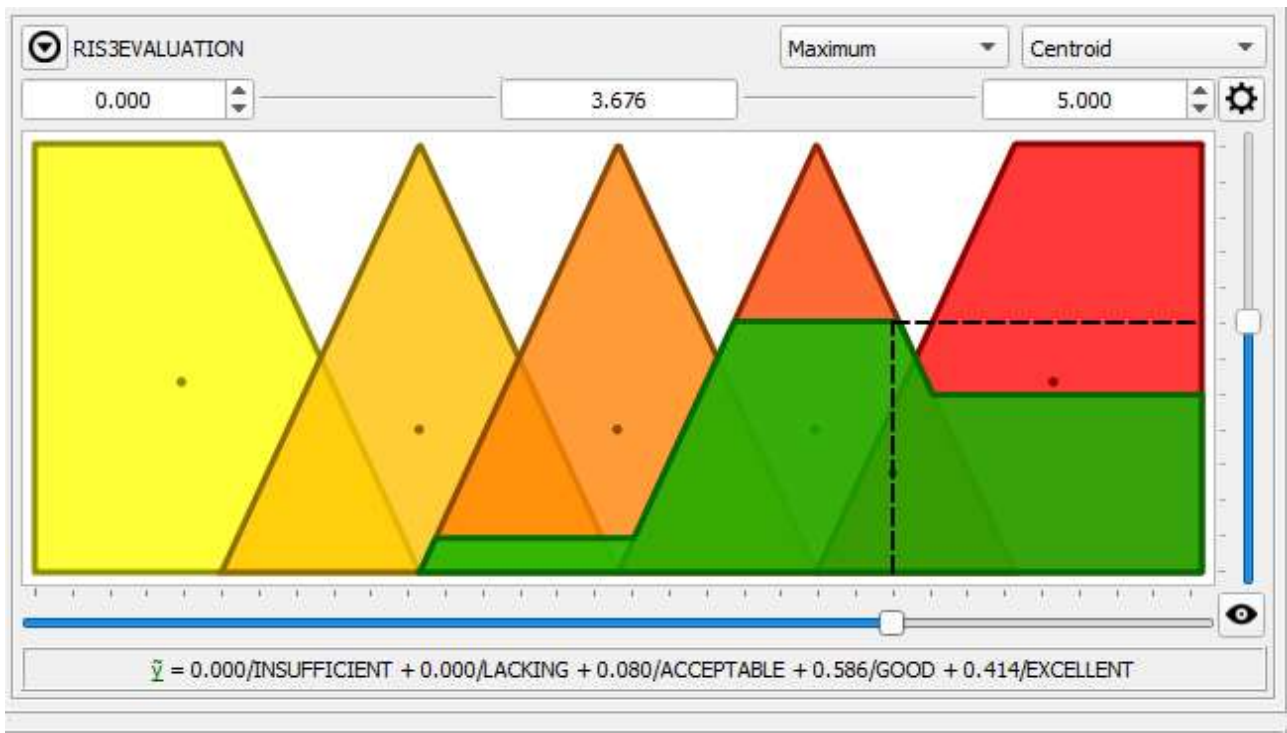
**Figure 2.7 – RIS3 Assessment Wheel 2.0 applied to The Basque Country’s RIS3 – Spider Graph**



Source: graph elaborated by the author

Figure 2.7 confirms what the table displays. In the spider graph the red line is quite homogeneous and runs along high punctuation levels. There are two down peaks, which are referred to communication strategies and pilot projects, where The Basque RIS3 scores respectively 2 and 1. Step six does not have high punctuation levels, therefore the “Monitoring and evaluation” of the region suffers of lacks and criticalities. This means that the region should improve its current monitoring framework and capability. However, the overall strategy is consistent, well developed and organized, therefore the graph does not show relevant shortcomings in the design.

**Figure 2.8 – The Basque Country’s RIS3 fuzzy assessment**



Source: figure elaborated by the author

Figure 2.8 shows the assessment made through the Fuzzy logic. The strategy has received a qualitative judgement of “ACCEPTABLE” with a membership grade of 0.080, a judgement of “GOOD” with a membership grade of 0.586 and an “EXCELLENT” with a membership grade of 0.414. Therefore, it is possible to consider the RIS3 of The Basque Country as a good/excellent strategy, but this not exclude a little possibility of having acceptable outcomes. The inference rules activated are 32 over 64 of possible combinations within 729 rules. The green area lays on “ACCEPTABLE”, “GOOD” and “EXCELLENT” output variables, this means that the strategy has been written and designed properly, receiving an overall high punctuation. Moreover, the fuzzy method gives an overview of the grade of probability that the strategy can achieve the expected results. Hence, in the case of The Basque Country RIS3 it is possible to suppose that the strategy can lead to good or excellent outcomes, having a good probability to achieve them. By the way, the little probability of having acceptable outcomes should not be avoided.

This assessment might be useful and it can furnish additional information during the monitoring and evaluation phase, in order provide insights and considerations about the effectiveness of the S3 in the region. One possible answer regarding the achievement or non-achievement of the goals, may be the quality of the strategy design.

## Chapter 3 - The RIS3 of Extremadura

Key words: Extremadura, RIS3, Assessment, Strategy, Regional overview, Spider graph, Fuzzy logic

Extremadura is the second region that has been chosen for the assessment. The choice derives from the intention to compare a RIS3 designed by a more developed region, with a RIS3 designed by a less developed region. Therefore, in the Spanish context, the only region that is classified as less developed region, with a GDP per capita lower than the 75% of the E.U.'s average, is Extremadura.

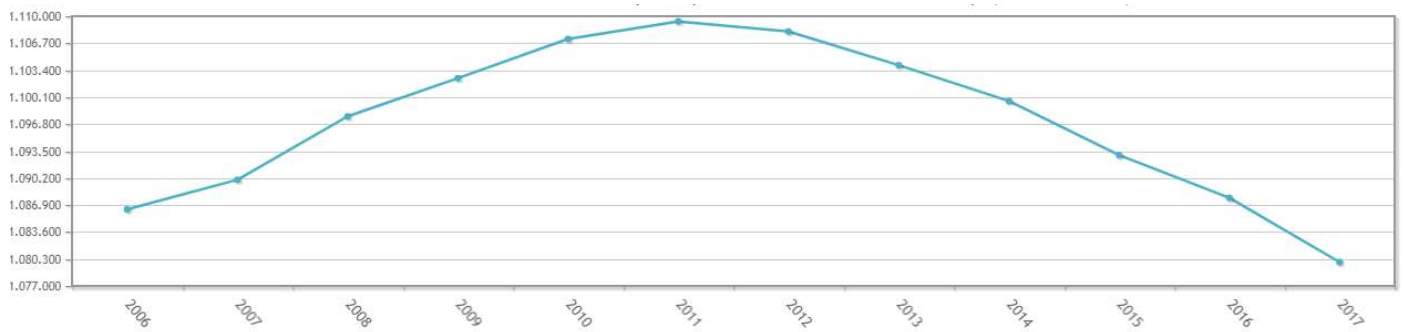
This chapter is formed as following: in section 3.1 a brief overview of the region, considering population, education and economy is presented. Then, in section 3.2 the structure of its Smart Specialisation Strategy is described. Finally, in section 3.3 the assessment of the RIS3 by using the threefold method will be provided.

### 3.1 Extremadura: an overview

With an area of 41,634 km<sup>2</sup> (European Commission, 2010b) and a population in 2016 of 1,087,778 people, (European Commission, 2010b) Extremadura is one of the least populated region in Spain and it is the only Spanish region categorized as less developed area. Extremadura, whose capital is Mérida, is located in centre of Spain and its borders are shared with Portugal to the west, Castile-La Mancha to the east, Castile and Leon to the north and Andalusia to the south. The region is divided into two provinces, which are Badajoz and Cáceres. The per capital GDP is 16,369 euro (European Commission, 2010b) “which is one of the lowest in the country” (European Commission, 2010b), and it is far below the national average (24,100 euro) and the E.U average (29,121 euro). In addition, the regional GDP of 17,712 million euro (European Commission, 2010b)

Figure 3.1 shows that the population of Extremadura firmly grew up to 2011, where it reached its peak with more than one million and one hundred thousand people. However, from 2012 the population trend started its descent parabola, by touching one million and eighty thousand people, which is the lowest peak since 2006.

#### Figure 3. 1- Extremadura population trend (2006-2017)



Source: ‘Instituto Nacional de estadística’, 2018

This negative trend is also confirmed by births that saw a drop in the last five years, passing from 9,423 to 8,783 individuals as table 3.1 shows. However, this tendency is common in Europe and in the table all regions, with the exception of Baden-Württemberg, follow the same trend.

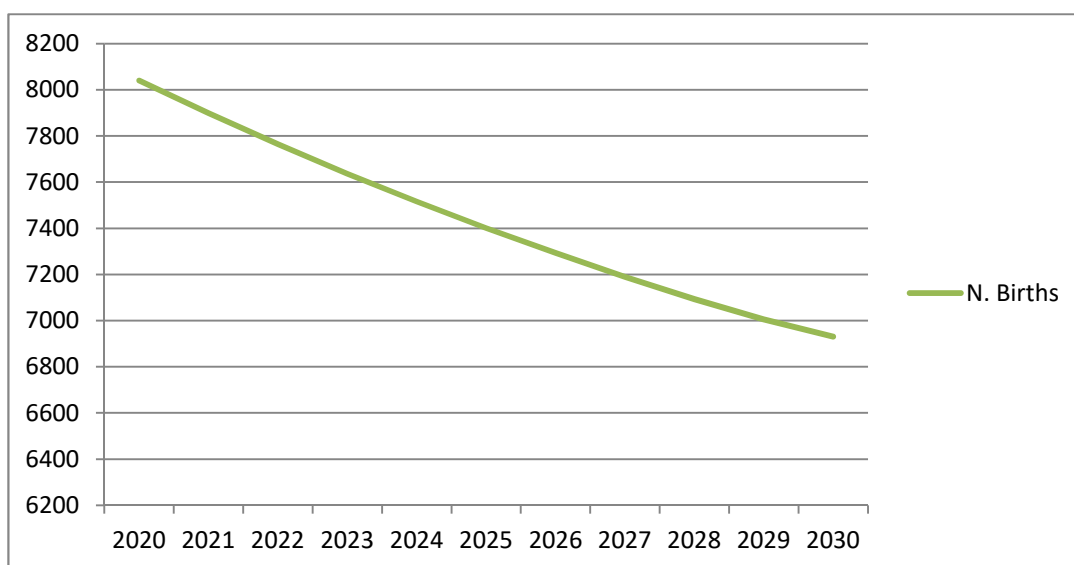
**Table 3. 1- Extremadura live births trend (2012-2016)**

	2012	2013	2014	2015	2016
<b>Extremadura</b>	9,423	8,880	9,167	8,895	8,783
<b>Basque Country</b>	20,533	19,116	19,379	18,849	18,247
<b>Emilia-Romagna</b>	39,337	38,057	36,668	35,813	34,578
<b>Baden-Württemberg</b>	89,477	91,505	95,632	100,269	107,489
<b>Lombardy</b>	91,798	88,410	86,239	84,149	81,588

Source: Eurostat – Table elaborated by the author

The situation is not supposed to improve, because in accordance with the Instituto de Estadística de Extremadura, the future projections are even worse, as figure 3.2 shows.

**Figure 3.2 - Extremadura birth projections (2020-2030)**



Source: ‘Banco de datos - Portal Ciudadano’, 2018– Graph elaborated by the author

Moreover, Extremadura shows the lowest fertility rate among the regions compared by table 3.2, far lower than Spain’s rate and The Basque Country’s rate. France is the region that shows the highest fertility rate, followed by Lombardy.

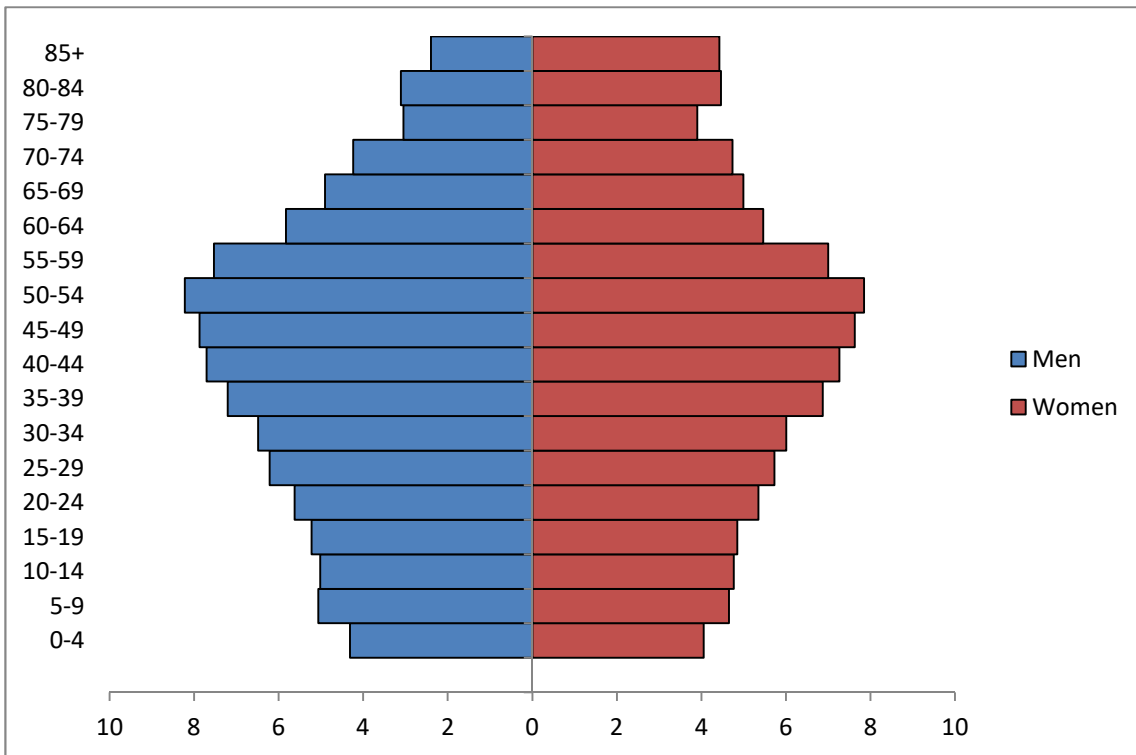
**Table 3.2 - Extremadura fertility rate (2012-2016)**

	2012	2013	2014	2015	2016
<b>Extremadura</b>	1.27	1.22	1.29	1.28	1.30
<b>Spain</b>	1.32	1.27	1.32	1.33	1.34
<b>Basque Country</b>	1.35	1.30	1.38	1.39	1.39
<b>Baden-Württemberg</b>	1.40	1.40	1.46	1.51	1.59
<b>Germany</b>	1.41	1.42	1.47	1.50	1.60
<b>Italy</b>	1.43	1.39	1.37	1.35	1.34
<b>Emilia-Romagna</b>	1.49	1.45	1.42	1.42	1.40
<b>Lombardy</b>	1.52	1.48	1.46	1.44	1.42
<b>France</b>	2.01	1.99	2.01	1.96	1.92

Source: Eurostat – Table elaborated by the author

Regarding the composition of the population in 2017, Figure 3.3 shows that the majority of the population in Extremadura ranges between the 30 and 60 years of age. In addition, the part of the population that can be considered elder, almost equalizes youths and infants.

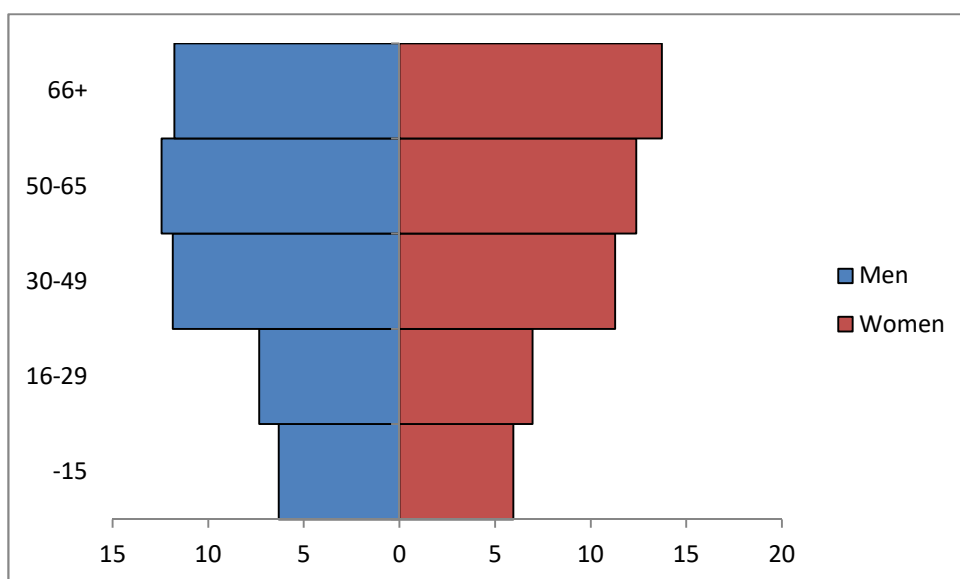
**Figure 3.3 - Population composition of Extremadura in 2017**



Source: Eurostat – Graph elaborated by the author

The situation gets worsen if we look at the projection, in fact, figure 3.4 shows that in 2031 the elders will overtake youths.

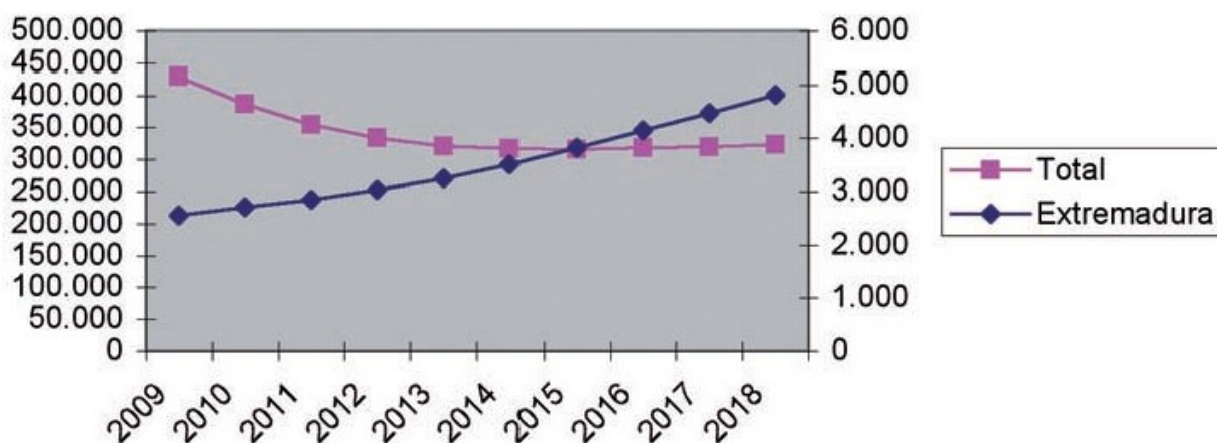
**Figure 3.4 - Population composition of Extremadura in 2031 (projection)**



Source: ‘Banco de datos - Portal Ciudadano’, 2018– Graph elaborated by the author

“The migration flow instead, shows an increase in the number of people who go to foreign countries, with an opposite trend with respect to the rest of the country, as displayed by figure 3.5, 2010 registered an outflow of 2,556 people, whereas 2018 registered an outflow of 4,805 people” (Consejo Económico y Social de Extremadura, 2010 – page 89).

**Figure 3.5 - Emigrants with foreign destiny (2009-2018)**



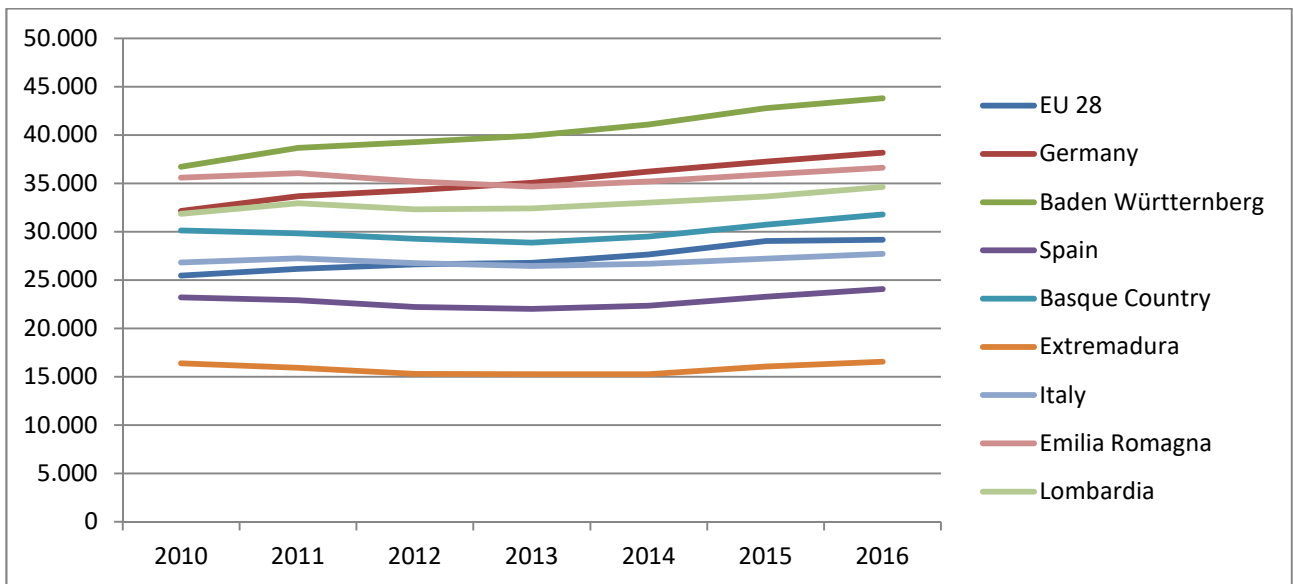
Source: “Consejo Económico y Social de Extremadura”, 2010, page 90

According to the Regional Innovation Scoreboard of the European Commission, the economy of Extremadura is strongly based on tertiary sector, which counts for the 71.3% of the entire economy,

followed by the secondary sector, which counts for the 22.2% of the total and then from the primary sector, which counts for the 6.5%, holding a significant weight in the economy of the region.

As said before, Extremadura has a per capital GDP of 16,369 euro, which is one of the lowest in the country and it is far below the national average (24,100 euro) and the E.U.’s average (29,121 euro). This is confirmed by figure 3.6, where Extremadura has the lowest per capita GDP among the regions selected, which is far lower with respect to Emilia Romagna, Basque Country, Spain and E.U. Moreover, the variation in the period from 2010 to 2016 is minimal, whereas other regions have seen little improvements.

**Figure 3.6 - Per capita GDP variation (2010-2016)**



Source: Eurostat – Graph elaborated by the author

The unemployment rate is attested to be one of the highest in Spain. Table 3.3 shows that even though the unemployment rate of the region has improved since 2013, where it attested at 33.9% of the active population, in 2017, with 26.3% is still the second highest after the community of Melilla. Moreover, it is almost ten points higher than Spanish’s rate and almost the triple than E.U’s rate. Emilia Romagna and The Basque Country attested their relative’s employment rate in 2017 at 6.6% and 11.3%.



**Table 3.3 - Extremadura unemployment rate trend (2013-2017)**

	2013	2014	2015	2016	2017
<b>Baden-Württemberg</b>	3.4	3.1	3.1	3.1	2.9
<b>Germany</b>	5.2	5.0	4.6	4.1	3.8
<b>Emilia-Romagna</b>	8.4	8.4	7.8	7.0	6.6
<b>European Union</b>	10.9	10.2	9.4	8.6	7.6
<b>Comunidad Foral de Navarra</b>	18.0	15.7	13.8	12.5	10.2
<b>Italy</b>	12.2	12.7	11.9	11.7	11.2
<b>País Vasco</b>	16.6	16.3	14.8	12.6	11.3
<b>Aragón</b>	21.4	20.2	16.3	14.8	11.7
<b>La Rioja</b>	20.0	18.2	15.4	13.5	12.0
<b>Illes Balears</b>	22.3	20.0	17.3	13.9	12.4
<b>Comunidad de Madrid</b>	19.8	18.8	17.1	15.7	13.4
<b>Cataluña</b>	23.1	20.3	18.6	15.7	13.4
<b>Cantabria</b>	20.5	19.4	17.7	14.9	13.6
<b>Principado de Asturias</b>	24.1	21.1	19.1	17.6	13.7
<b>Castilla y León</b>	21.8	20.8	18.3	15.8	14.1
<b>Galicia</b>	22.1	21.7	19.3	17.2	15.7
<b>Spain</b>	26.1	24.5	22.1	19.6	17.2
<b>Región de Murcia</b>	29.0	26.6	24.6	19.8	18.0
<b>Comunidad Valenciana</b>	28.1	25.8	22.8	20.6	18.2
<b>Castilla-la Mancha</b>	30.0	29.0	26.4	23.6	20.8
<b>Ciudad Autónoma de Ceuta</b>	34.8	31.9	27.6	24.9	22.4
<b>Canarias</b>	33.7	32.4	29.1	26.1	23.5
<b>Andalucía</b>	36.2	34.8	31.6	28.9	25.5
<b>Extremadura</b>	33.9	29.8	29.1	27.5	26.3
<b>Ciudad Autónoma de Melilla</b>	32.5	28.4	34.0	30.8	27.6

Source: Eurostat – Table elaborated by the author

The Regional Innovation Scoreboard classifies Extremadura as a “moderate innovator” with a score of 55.3, considering a score of 0.062 in EPO patent application, 0.216 in scientific co-publication and 0.264 in product or process innovators (see database ‘European Commission’, 2017)

Regarding the R&D expenditure, Extremadura ranks in one of the last positions in Spain (see table 3.4). The expenditure in 2015 was only the 0.68% of the regional GDP and it has been decreasing since 2011. This is far behind to the 3% recommended by the European Commission for 2020. The table shows a general contraction with respect to R&D expenditure. Only Emilia Romagna and Murcia show positive trends.

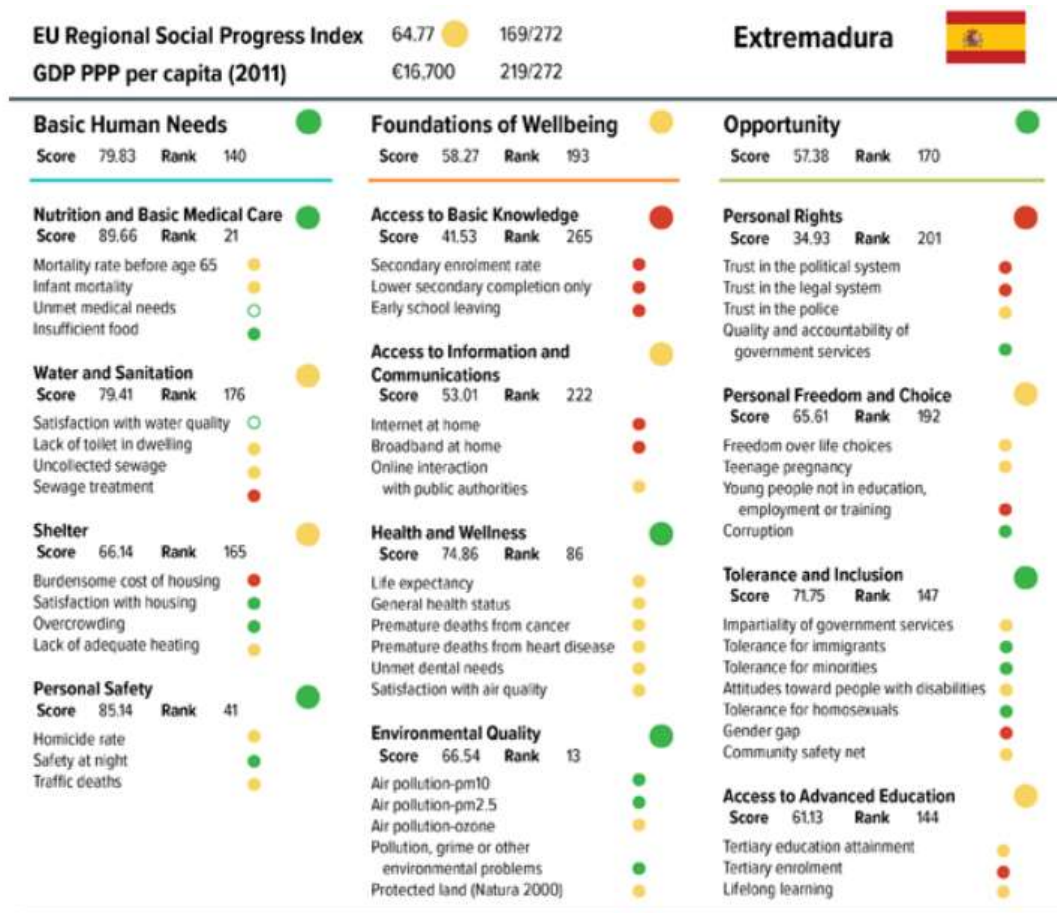
**Table 3.4 - R&D Expenditure (% of regions' GDP) 2011-2015**

	2011	2012	2013	2014	2015
Ciudad Autónoma de Ceuta	0.08	0.07	0.06	0.07	0.06
Ciudad Autónoma de Melilla	0.13	0.14	0.13	0.13	0.07
Illes Balears	0.37	0.35	0.34	0.32	0.33
Canarias	0.59	0.53	0.51	0.49	0.49
Castilla-la Mancha	0.67	0.61	0.55	0.54	0.55
<b>Extremadura</b>	<b>0.82</b>	<b>0.76</b>	<b>0.77</b>	<b>0.7</b>	<b>0.68</b>
Región de Murcia	0.86	0.86	0.85	0.88	0.89
La Rioja	1.03	0.91	0.82	0.93	0.9
Aragón	0.95	0.96	0.91	0.92	0.9
Castilla y León	1.04	1.16	1.02	1.02	1
Comunidad Valenciana	1.04	1.05	1.05	1.04	1
Andalucía	1.14	1.06	1.07	1.06	1.03
<b>Spain</b>	<b>1.33</b>	<b>1.29</b>	<b>1.27</b>	<b>1.24</b>	<b>1.22</b>
Cataluña	1.55	1.53	1.53	1.49	1.52
Comunidad Foral de Navarra	2.11	1.97	1.81	1.76	1.62
Comunidad de Madrid	1.89	1.76	1.78	1.7	1.72
Comunidad de Madrid	1.89	1.76	1.78	1.7	1.72
<b>Emilia-Romagna</b>	<b>1.42</b>	<b>1.61</b>	<b>1.64</b>	<b>1.7</b>	<b>1.79</b>
<b>País Vasco</b>	<b>2.14</b>	<b>2.24</b>	<b>2.12</b>	<b>2.04</b>	<b>1.91</b>
<b>European Union</b>	<b>1.97</b>	<b>2.01</b>	<b>2.02</b>	<b>2.03</b>	<b>2.04</b>

Source: Eurostat – Table elaborated by the author

On the side of the wellbeing, Extremadura is ranked by the European Social Progress Index, which aims to measure social progress for each region by following the framework of the global Social Progress Index that is made up of three dimensions such as basic human needs, foundations of wellbeing and opportunity, below the average, scoring 169 on 272. In figure 3.7 it is possible to see that Extremadura is above the average only in personal safety (41/272) and environment quality (13/272)

Figure 3.7 - European Regional Social Progress Index for Extremadura



Source: 'European Social Progress Index', 2018

### 3.2 Extremadura's RIS3

The Smart Specialisation Strategy of Extremadura, called "Estrategia RIS3 Extremadura 2014-2020", is a 235 pages document published by the government of Extremadura on December 2013, whose second version was published on May 2015. Its purpose is to

"Increase the size, the added value and the global competitiveness of the socio-economic fabric of Extremadura, through policies that allow the use and development of technologies related to its sources of differentiation based on the sustainable exploitation of natural and cultural resources and in the capacity to generate quality of life in its demographic context, connected with the challenges of Europe 2020 and the global trends that generate opportunity."(Gobierno de Extremadura, 2015 - Estrategia RIS3 Extremadura 2014-2020 page 11)

The strategy derives from various phases of different development policies, whose initial was the ‘Ley de la Ciencia’ of 1986. Then the region passed through several regional development plans, starting from the ‘I Plan regional de Investigación y Desarrollo Tecnológico de Extremadura (1998-2000)’ for ending with the ‘IV Plan regional de Investigación y Desarrollo Tecnológico de Extremadura (2010-2013)’, whose following, the “V”, was elaborated in coordination with the RIS3 strategy.

The framework of the strategy is based on four main lines of action, which targets ‘Culture, Talent, Entrepreneurial fabric, Infrastructures’. Regarding the priorities of the RIS3, Extremadura aims to invest in Tourism, Clean Energies, ICT, Healthcare and Agri-food. Table 3.5 below, summarized the relative’s priorities.

**Table 3.5 – Extremadura Smart Specialisation priorities**

<b>Priority</b>	<b>Economic Domain</b>	<b>Scientific Domain</b>	<b>Policy Objective</b>
<b>Tourism</b>	Accommodation and food service activities	Culture, recreation, religion and mass media	Cultural and creative industries
<b>Clean Energies</b>	Electricity, gas, steam and air conditioning supply	Energy	Sustainable innovation
<b>ICT</b>	Information and communication technologies	Transport, telecommunication and other infrastructures	Digital transformation
<b>Healthcare</b>	Human health and social work activities	Health, general advancement of knowledge	Digital transformation
<b>Agri-food</b>	Agriculture, forestry and fishing	Industrial production and technology, Agriculture	Sustainable innovation

Source: ‘Eye@RIS3 - Smart Specialisation Platform’, 2018. Table elaborated by the author

The first priority, Tourism, is focused on the development of activities related to three areas of action:

1. Preservation of natural and cultural heritage

2. Introduction of new technologies in the sector
3. Development of new tourism products that allow to take advantage of existing resources and boost demand. ('Eye@RIS3 - Smart Specialisation Platform', 2018)

These type of activities “are considered to be those aimed at promoting the preservation and optimisation of the use of natural resources, the management of protected areas or the regeneration of the autochthonous biodiversity that favour nature tourism or agro-tourism.” ('Eye@RIS3 - Smart Specialisation Platform', 2018)

In the second priority, Clean Energies, Extremadura aims to develop two aspects:

- Large scale use of production plants in operation as laboratories for field testing of new developments related to thermo-solar and photovoltaic technologies, where domains such as Electronics, Automation and Electrical Engineering are involved
- Development of technology for small and medium scale production, as well as systems related to the smart energy management where Information and Communications Technologies play an important role. ('Eye@RIS3 - Smart Specialisation Platform', 2018)

For ICT instead, Extremadura is aiming to use a series of key activities with high potential for specialisation in the sector in the region are “Data management, Cloud Computing, high performance computing, Networks and Mobile Systems”. ('Eye@RIS3 - Smart Specialisation Platform', 2018)

In the Healthcare area of specialisation, the region gathers the strategic activities in two categories:

1. “Activities related to socio-health care
2. Activities aimed at the diagnosis and treatment of diseases” ('Eye@RIS3 - Smart Specialisation Platform', 2018)

Therefore, “tele-medicine, tele-care, or the development of applications for care and assistance in the home, as well as the monitoring of chronic patients, are considered key activities for the region.” ('Eye@RIS3 - Smart Specialisation Platform', 2018)

Finally Agri-food in divided into three major areas for research and development:

1. “Agricultural production.

2. S&T of food.
3. Economic activities derived from the generation of value from this industry, such as agro-tourism or gastronomy.” (‘Eye@RIS3 - Smart Specialisation Platform’, 2018)

The first one is related to “the integral management of pasture, food and animal welfare, animal and plant genetics, as well as the incorporation of ICTs in agriculture”, (‘Eye@RIS3 - Smart Specialisation Platform’, 2018), whereas the second one is related to food technologies in order to boost the agricultural sector in the region. Eventually, the third one is related to “food preservation and packaging technologies and the development of new products and new formats such as those of IV and V range” (‘Eye@RIS3 - Smart Specialisation Platform’, 2018)

### **3.3 Extremadura’s RIS3 assessment**

The tables below correspond to the evaluation of the eighteen priority areas, by scanning the RIS3 of Extremadura according to the tables of section 1.3.1.

**Table 3.6 – STEP 1 Regional Context and potential for innovation**

Priority area	RIS3 references	Marks	Comments
<b>Regional assets</b>	Pages: 42-88;54-61;67-88	5	Good geographical assessment and excellent context assessment, which is always in relation with other Spanish and European regions. There is a context analysis per sectors, enterprises typologies, R&D activity, export and school drop rates. Detailed analysis of the current situation of the region, which is taking into consideration different facets. In addition, in the data reported, good and wide comments are provided. The cluster mapping, research infrastructure mapping is well done. Moreover, in the sectoral analysis, the number of employees, enterprises and the impact of each sector is done. The SWOT analysis is really well explained. For each area, additional and wide comments and considerations are provided, also by displaying an analysis of different faces, such as tables and figures. For each area of the SWOT, a sort of foresight is made.
<b>Beyond regional boundaries</b>	Pages: 42-53;67-88;129-138	5	The benchmarking analysis, which is done at National and European level is well performed . Several aspects are analyzed, such as the education, employed population, R&D+I, employment. Moreover, specialisation indexes are described and compared. The benchmarking analysis is also carried out for the areas of specialisation, by assessing and evaluating the performance and the position of the region in relation with other EU regions. Cooperation activities with other regions are outlined. In the SWOT analysis the interregional collaboration with enterprises at EU level and cooperation about patent activity are analyzed. In addition, there is an assessment regarding the position of the region related context and regional features peculiarities and sectors
<b>Entrepreneurial discovery</b>	Pages: 61-124	5	The EDP is carried out by describing not the process but the sectors where the region has a competitive advantage. Moreover, it is also described the data and coefficient that the region has taken as reference in the analysis of the areas of greatest development. Regarding the EDP most of

		<p>the space is given to the analysis and assessment of the sectors that have the greatest future potential development, and the main domains and specialisations of the region. There is a great assessment of the regional entrepreneurial environments, such as the condition and context about the areas of specialisation, such as energy, ICT, Tourism. There is a strong recognition and analysis of the strength of the region by providing tables, data and references. For the areas of specialisation there is a good entrepreneurial environment assessment by providing specific and detailed information. There is a great of scientific production indicators such as patents and R&amp;D for the areas referred to the EDP, publications, scientific domain, and projects financed. The SWOT analysis provides good foresight regarding the weaknesses and opportunities of the region. Possible new pattern and future lines of actions are outlined in relation with the features identified in the current context</p>
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Source: table elaborated by the author



**Table 3.7 – STEP 2 Governance**

<b>Priority area</b>	<b>RIS3 references</b>	<b>Marks</b>	<b>Comments</b>
<b>Quadruple helix engagement</b>	Pages:34-41	3,5	The quadruple helix engagement process is resumed in one main table. The information provided is densely summarised, however all the relevant elements are present. There is not an indication of the enterprises and agents involved, which are the same that compose the Governance. The region uses a wide range of different activities for the involvement of the stakeholders such as workshops, WebPages seminars, and questionnaire. The region shows a good commitment in the design and definition of the strategy by carrying out several activities. There is no specific mention about boundary spanners, sector champion or business community involvement. However, that information can be deduced in the text.
<b>Governance structure definition</b>	Pages:34-41;207-209	4	The governance and the specific bodies belonging to it are clearly defined. There is good description of the tasks, roles and responsibilities of each body. However, the members who compose each body are generally defined and there is not a detailed indication regarding each of them. Nevertheless, the structure is good and the actors are clearly identifiable. In addition, there are indications and descriptions about the roles and responsibilities that the bodies of the governance have in the monitoring and evaluation phase. The structure is well drawn. The steering group is the Comité Técnico RIS3, with the support of the Consejo Asesor of CTIE, whereas the management team is the Equipo de Gestión RIS3. Finally, the working group are the key agents involved in the definition of the strategy.
<b>Multi-fund approach</b>	Pages:32-33;211-230	3	Different budgetary sources are identified. ESIF, Horizon 2020, COSME, NER300, private funding sources such as Business angels, consortium, private funds, national funds. There is a long and description about the meaning of each funding source, by also considering the overall budget estimation. The funding sources are also categorized per different European Programmes. Moreover, they are put in relation with the lines of action of the action plan of the strategy. Several diagrams for each axis of interest are provided. However, the budget referred to the axis is just summarized and not much information about the expense prospect and how the funds will be used is given.

			Indications about the alignment between the RIS3 objectives and the national strategies is present. The document outlines the main regional and national strategies that are build upon the RIS3.
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Source: table elaborated by the author

**Table 3.8 – STEP 3 Overall vision for the future of the region**

<b>Priority area</b>	<b>RIS3 references</b>	<b>Marks</b>	<b>Comments</b>
<b>Depict a regional scenario</b>	Pages: 9-23;67-88	3,5	There is no mention about Europe 2020 dimensions, however the regional scenario is well depicted. The region has its focus on the natural features and resources and the technology interrelated with its natural characteristics. Moreover, the region has clear its point of departure and the possible path of transformation and innovation that the RIS3 may bring to, especially regarding RIS3's priorities and concrete actions. Its vision about the scenario of innovation is well outlined. Extremadura puts in place different and several strategic lines for the support of this process. The SWOT analysis helps to depict the current and possible new scenario thanks to the assessment of the regional context. Regarding Europe 2020 dimensions, the region can be identified as a rural region, non S-T driven region with population outflow. The regional international perspective is a service-led and natural resource-based region. Regarding the connectivity degree Extremadura can be seen as a connecting globally region (peripheral region lacking strong research strengths and international connectors).
<b>Create a common and clear vision</b>	Pages: 9-13; 137-142	4	The dream and mission of the RIS3 are clearly identified. Therefore, the region has set the societal challenges to face. For each of them a SWOT analysis is provided. This identifies different facets: a clear vision of the region, the renewal and transformation path embarked by the different strategic axis identified, the goals and objectives Extremadura wants to achieve. There is a sort of scenario building, by identifying the potential impact and future implications and consequences the RIS3 might bring to the region. Furthermore, there is a list of the benefits and societal developments the region want to bring to society.
<b>Communication strategies</b>	Pages: 37-41; 137-142	3,5	The region well defines the goals of the strategy through the SWOT analysis. Thus, it well identifies and place itself in the European context. The communication strategies are those related with the quadruple helix engagement. There is a good and wide range of the different strategies for the communication. Extremadura carries out RIS3 debate with questionnaires, workshops seminars and meetings. For the citizenship involvement websites are used. The strategy describes and identifies several

			communication strategies and tools, however, they are just listed and there is not much evidence or detailed description over it. Moreover, the part of the citizenship involvement has left a bit aside. Nevertheless, the targets group for the communication are well identified and the activities made for the RIS3 vision sharing are well explained, even though the information provided is not extended but summarized and condensed.
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Source: table elaborated by the author

**Table 3.9 – STEP 4 Identification of priorities**

Priority area	RIS3 references	Marks	Comments
<b>Innovation and Research priorities</b>	Pages: 24-33;89-128;143-145	4,5	Good description of the past experiences. The region well describes the pattern of the five past phases that brought to the RIS3. In addition, it examines the budgetary sources and expenditure for each past regional programming period. The description is well made and these experiences had a relevant weight in the policy development of the region. There is a great analysis of the areas that have the highest potential impact and the selection of priorities. The region carries out a deep investigation about the areas of excellence, using also a coefficient of regional specialisation for justifying the selection of the five areas of specialisation. In addition, the region analyses the export and economic capacity referred to each priority area. It makes a sort of extroversion analysis for detecting and explaining the magnitude of the sectors where Extremadura has decided to invest in. There is a great alignment with regional potential innovation and differentiation and the excellence domains. Extremadura carries out an assessments regarding scientific domain specialisation referred to the priority areas.
<b>Development of priority areas</b>	Pages: 100-128; 143-152	3	The region identifies two horizontal priorities, five cross-sectional priorities and five areas of excellence. There is a good presentation of the priority areas, however, even though the analysis regarding the choices of the priority areas is well structured and described, the presentation of them is not very deep. The information provided is consistent by describing the scientific domains the R&D activities and the project associated to the priority areas, but the strategy does not describe the relevant actors and players involved in the priority areas. In addition, during the development of the priority areas, the investigation does not has relevant insight. For the horizontal priorities the information provided is quite good, but is a bit general and not specific. There is a great overview of the region capabilities, but the activities described and the actions that the region wants to carry out are smoky, not displaying concrete ideas how to be performed.
<b>Innovation Delivery Instruments</b>	Pages: 102;105;136-137;141; 145; 176; 182-190; 215	3,5	Most of the innovation delivery instruments are entailed into the priority areas and described within the development of them. The digital agenda is well described and explained. The

		<p>SWOT analysis provides a great description of the pattern and objectives of the digital agenda. In addition, the region explains the goals and impacts the digital agenda wants to have, by identifying nine main challenges that wants to accomplish. No specific references about KETs. They are defined within the action plan, but they are not clearly specified. Cultural and creative industries are encompassed in the definition and description of the different priority areas. The necessity to protect and develop the cultural heritage in Extremadura is remarked as a priority in the definition of a new way of tourism activities and cultural environment protection. However, there is not a specific section or part where they are individually considered and analysed. There is a brief mention about public procurement, defined as innovation delivery instrument for the improvement of the public sector. Green growth and social innovation are not analysed independently but they are encompassed within the development of the priority areas. For example the energy priority area includes clean energy and green growth. On the other hand, social innovation delivery instrument are contained in TIC and tourism priority areas.</p>
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Source: elaborated by the author

**Table 3.10 – STEP 5 Definition of policy mix and action plan**

Priority area	RIS3 references	Marks	Comments
<b>Composition of the policy mix</b>	Pages: 153-181;211-217	4	Regarding the innovation delivery instruments the region displays a series of development programmes which entail different innovation delivery instruments. There is a presence of knowledge exploitation delivery instruments such as traditional and emerging instruments, especially for PhD students and talent recruitment. In addition, the region displays global connectors instruments for internationalisation, knowledge generation instruments such as partnerships with other regions, support for SME and R&D activities among enterprises. There is not much about instruments targeting excellence poles or clusters. Regarding the budgetary sources, different budgetary instruments are identified in order to support SME and specific programmes targeting specific targets. The weakness regarding the policy mix in that the information provided is well described, but a bit too much theoretical with a lack of concrete structure. By the way the plans where the delivery instruments are deployed are various and target different areas.
<b>Action Plan</b>	Pages : 153-181	3,5	The region defines a very long and detailed list with wide description about the strategic objectives of the action plan. For each line of action and horizontal priority the region develops a wide range of different secondary programs targeting specific aims. The detail and the explanation is extended and deep. In addition, the region defines the actors involved, their responsibilities and the programmes where they are involved. Nevertheless, the action programme misses to mention timeframes and measurable targets. In addition, the information provided is a bit too much theoretical and not much grounded.
<b>Pilot projects</b>		0	There is no evidence about pilot project whatsoever

Source: table elaborated by the author

**Table 3.11 – STEP 6 Monitoring and evaluation**

<b>Priority area</b>	<b>RIS3 references</b>	<b>Marks</b>	<b>Comments</b>
<b>Indicators</b>	Pages:191-203	5	Good and deep explanation and description about the indicators. The structure of the monitoring and evaluation phase is well described and displayed. The region provides schemes in order to show off the monitoring system. Presence of all three indicator typologies. The indicators are well presented and different timeframes 2016-2018-2020 are defined (short, medium and long term results). The context indicators are divided per challenges, whereas the output and result indicators are split per lines of action. For each indicator a great description of the strategic lines, the sources, the programme of reference and the different timeframes are provided.
<b>Objective and expected results</b>	Pages:191-210	4,5	The aims of the monitoring and evaluation activity are well described. In addition, the region sets out short, medium and long term results to accomplish. Furthermore, Extremadura plans to carry out a sort of intervention logic by involving the quadruple helix actors with session analysis and monitoring forums. The region set out different activities in order to better carry out the monitoring and evaluation step. The strategy deploys two different programme: one of monitoring and the other of evaluation. Both of them are well explained and the outputs referred to each plan, as well as the identification of relative activities and bodies in charge to perform those activities are defined.
<b>RIS3 update</b>	Pages :204-210	4	The peer review is just mentioned. The monitoring framework is well structured, furthermore d the bodies of the governance which are in charge of the monitoring activity are identified and their tasks and responsibilities are described. The plan of monitoring and evaluation is well defined, and the timeframes and the update frequency are clear. No use of balance scorecard or RIS3 social media analysis. Both future and outward orientation activities are defined thanks to the instruments and forums the region deploys to better perform the monitoring activity and follow the developments of the strategy in relation to the changing of the context of the region.

Source: table elaborated by the author



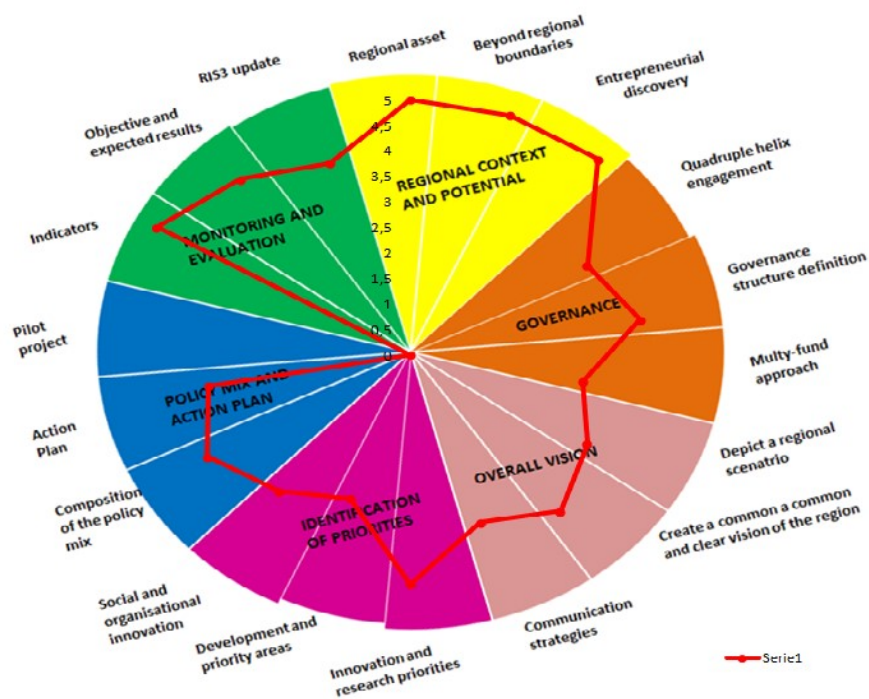
**Table 3.12 – RIS3 Assessment Wheel 2.0 applied to Extremadura’s RIS3 - Table**

<b>RIS3 Assessment Wheel 2.0 - Extremadura</b>		<b>Insert marks between 0 and 5 in this column (half points i.e. 3,5 are possible)</b>	<b>The structure of this table is taken from the original Assessment Wheel, developed by Christian Saubliens, and modified by Filippo Damiani and Filippo Ferrarini based on the guidelines in the RIS3 Guide and in the Online S3.</b>
<b>RIS3 Steps</b>	<b>Priority Areas</b>	<b>Marks</b>	<b>Topics</b>
<b>REGIONAL CONTEXT AND POTENTIAL FOR INNOVATION</b>	<b>Regional assets</b>	<b>5</b>	Regional context assessment Related variety analysis Differentiation patterns
	<b>Beyond regional boundaries</b>	<b>5</b>	Position of the region within the European and global economy Linkages of flows of goods, services and knowledge Interregional collaborations
	<b>Entrepreneurial discovery</b>	<b>5</b>	Areas of greatest future potential development Regional entrepreneurial environment assessment Foresight
<b>GOVERNANCE</b>	<b>Quadruple helix engagement</b>	<b>3,5</b>	Collaborative leadership building Boundary spanners Business community involvement
	<b>Governance structure definition</b>	<b>4</b>	Steering group Management team Working group
	<b>Multi-fund approach</b>	<b>3</b>	RIS3 budgeting Technical assistance funding National and RIS3 policy alignment
<b>OVERALL VISION FOR THE FUTURE OF THE REGION</b>	<b>Depict a regional scenario</b>	<b>3,5</b>	Identification of regional features Regional international perspective Connectivity degree
	<b>Create a common and clear vision of the region</b>	<b>4</b>	Mobilising power Renewal and transformational path Meeting social challenges
	<b>Communication strategies</b>	<b>3,5</b>	Definition of goals Identification of target groups Definition of communication tools
<b>IDENTIFICATION OF PRIORITIES</b>	<b>Innovation and research priorities</b>	<b>4,5</b>	Learning from the past Highest potential impact analysis Concrete and achievable objectives
	<b>Development of priorities areas</b>	<b>3</b>	Cross-sectoral priorities Horizontal priorities Priority areas presentation
	<b>Innovation delivery instruments</b>	<b>3,5</b>	KETs and Digital agenda Cultural and creative industries and innovative public procurement Green growth and social innovation
<b>DEFINITION OF POLICY MIX AND ACTION PLAN</b>	<b>Composition of the policy mix</b>	<b>4</b>	Traditional, emerging and experimental instruments Knowledge generation, diffusion and exploitation Global, regional or individual target
	<b>Action plan</b>	<b>3,5</b>	Definition of strategic objectives Definition of actors involved and targets Definition of timeframes
	<b>Pilot project</b>	<b>0</b>	Definition of the project Relevance with respect to RIS3 priorities Expected impact
<b>MONITORING AND EVALUATION</b>	<b>Indicators</b>	<b>5</b>	Result indicators Context indicators Output indicators
	<b>Objective and expected results</b>	<b>4,5</b>	Programme aims Outputs Short, medium, long-term results
	<b>RIS3 update</b>	<b>4</b>	Monitoring framework Peer review Orientation
<b>ARITHMETIC MEAN</b>		<b>3,81</b>	
<b>ST. DEVIATION</b>		<b>1,16</b>	
<b>WEIGHTED MEAN</b>		<b>3,57</b>	

Source: table elaborated by the author

Looking at table 3.12, it is possible to notice that the standard deviation is 1.16. There is some difference between the arithmetic mean and the weighted mean, the former scores 3.81 and the latter scores 3.57. This means that the composition of marks is quite homogeneous, but not at all. In fact, if we look at the marks we can see that there are differences of uniformity in the steps. The one that is less homogeneous is step five, however except step 1, which is the most homogeneous with a average score of five, all of them present differences of uniformity with respect of the priority areas. Nevertheless, the weighted mean is high, which means that the strategy and the priority areas are well designed.

**Figure 3.8 – RIS3 Assessment Wheel 2.0 applied to Extremadura’s RIS3 – Spider graph**

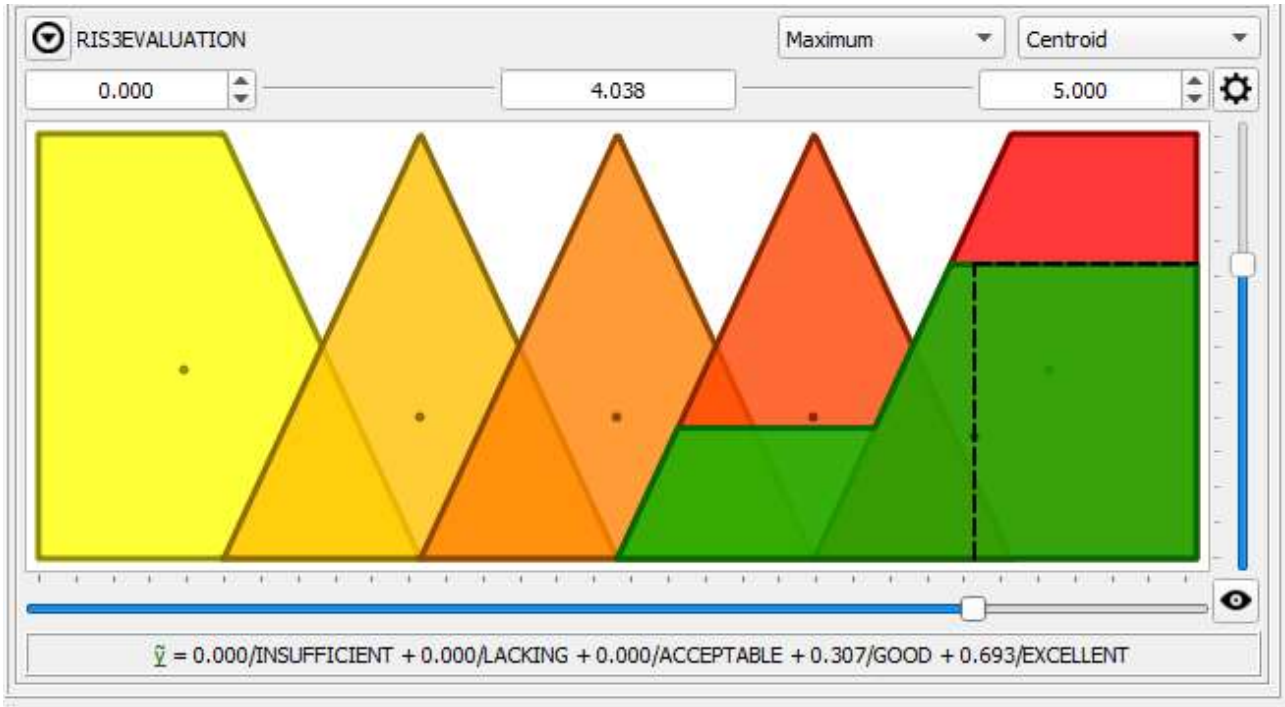


Source: graph elaborated by the author

Figure 3.8 confirms what the table displays. In the spider graph the red line is quite homogeneous and runs along high punctuation levels especially in step one “Regional Context” and six “Monitoring and evaluation”. Hence, as confirmed by the standard deviation, it is possible to notice how, from step two, the red lines passes through several ascent and descent peaks, confirming the uneven strategy, with respect to the priority areas’ development. There is only one high down peak

in the pilot projects, where the strategy scores 0, however we can see how Extremadura has designed a quite good strategy, by showing high marks in the priority areas.

**Figure 3.9 – Extremadura’s RIS3 fuzzy assessment**



Source: figure elaborated by the author

Figure 3.9 shows the assessment made by the Fuzzy logic. The strategy has received a qualitative judgement of “GOOD” with a membership grade of 0.307 and “EXCELLENT” with a membership grade of 0.693. Therefore, it is possible to consider the RIS3 of the Extremadura as an excellent strategy. The inference rules activated are 16 over 729. The majority of the green area lays on the “EXCELLENT” output variables, this means that the strategy has been written and designed very well, receiving an overall high punctuation. The possible outcome of the strategy might be excellent and with a strategy designed in this way, there is a good probability for the region to achieve the expected goals. Hence, it is possible to suppose that the strategy can lead to good or excellent outcomes depending on the quality of its design.

## Chapter 4 – The RIS3 of Emilia Romagna

Key words: Emilia Romagna, RIS3, Assessment, Strategy, Regional overview, Spider graph, Fuzzy logic

This chapter is devoted to the assessment of the Smart Specialisation Strategy of Emilia Romagna. Emilia Romagna has been chosen as third region for the comparative assessment of RIS3s, because it is in the intention of the author to compare the RIS3 of The Basque Country with a RIS3 of a region located in a different national context but with structural similarities. This purpose intends to verify whether two regions that are similar in the structure but belong to different contexts have the same capability and knowledge to design the RIS3. Therefore, the Regional Benchmarking Tool, jointly developed by The Basque Institute of Competitiveness and the S3 Platform, that finds reference regions based on structural similarities, was used for the research. Hence, with an index of distance of 0.0225 (European Commission, 2018b) Emilia Romagna was the less distant region from The Basque Country that was located in a foreign country that had structural similarities.

This chapter is formed as following: in section 4.1 a brief overview of the region considering population, education and economy is presented. Then, in section 4.2 the structure of its Smart Specialisation Strategy is described. Finally, in section 4.3 the assessment of the RIS3 by using the threefold method will be provided.

### 4.1 Emilia Romagna: an overview

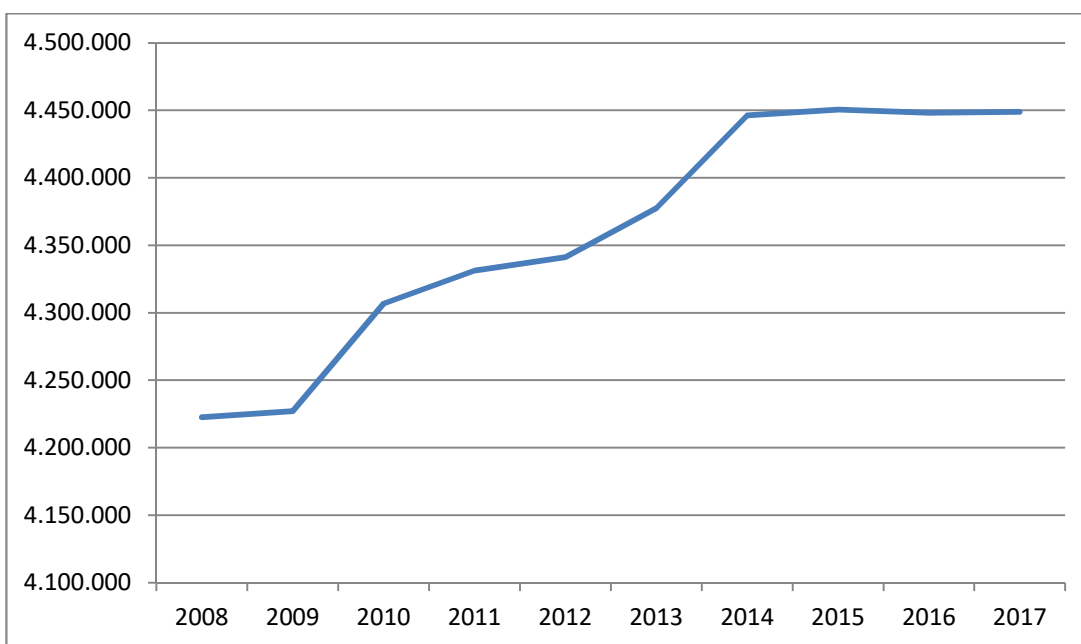
With an area of 22,451 km<sup>2</sup> and a population at January 2018 of 4,461,612 people, (Regione Emilia Romagna, 2018) Emilia Romagna “is a leading region in Europe in terms of entrepreneurship and economic dynamism” (Regione Emilia Romagna, 2016) and it is considered a ‘more developed region’ with a per capita GDP which is higher than the 90% of the average European per capita GDP. Emilia Romagna, whose capital is Bologna, the most populated city in the region, is located in the North-East of Italy and its borders are shared with Lombardy and Veneto in the north, Lombardy and Piedmont in the West, Liguria, Tuscany, Marche and the Republic of San Marino in the south, and the Adriatic sea in the east. In is considered an urban-coastal region with population inflow.

With a regional GDP of 153,997 million euro in 2016 and a per capita GDP in 2016 of 36,603 euro (Eurostat), Emilia Romagna is one of the wealthiest region in Italy with a very strong

manufacturing vocation and is “considered to offer a favourable environment for business and innovation, with an highly dynamic business environment, thanks to thousands of innovative SMEs and a number of strategic leaders in most of regional clusters”(European Commission, 2010c), with more than 370,000 active enterprises in 2015 (Eurostat).

Figure 4.1 shows that the population of Emilia Romagna has been growing in the last ten years. However, from 2014 the region saw a sort of stagnation in the number of population, which attested to be in 2018 4,461,612 people (Regione Emilia Romagna, 2018).

**Figure 4. 1- Emilia Romagna population trend 2008-2017**



Source: E.R. Statistica – Graph elaborated by the author

On the side of births, in table 4.1 Emilia Romagna find itself in a middle position, however, like other regions, with the only exception of Baden-Württemberg, Emilia Romagna shows a negative trend in term of births, dropped by the 12% from 2012.

This middle ranking is also confirmed by table 4.2, in the fertility rate, where the region has a rate of 1.40 in 2016, 0.9 points lower that the level of 2012. However, its fertility rate is higher than the national’s rate and Extremadura’s and THE Basque Country’s once.

**Table 4. 1 – Emilia Romagna live births trend**

	2012	2013	2014	2015	2016
<b>Extremadura</b>	9,423	8,880	9,167	8,895	8,783
<b>País Vasco</b>	20,533	19,116	19,379	18,849	18,247
<b>Emilia-Romagna</b>	39,337	38,057	36,668	35,813	34,578
<b>Baden-Württemberg</b>	89,477	91,505	95,632	100,269	107,489
<b>Lombardia</b>	91,798	88,410	86,239	84,149	81,588

Source: Eurostat – Table elaborated by the author

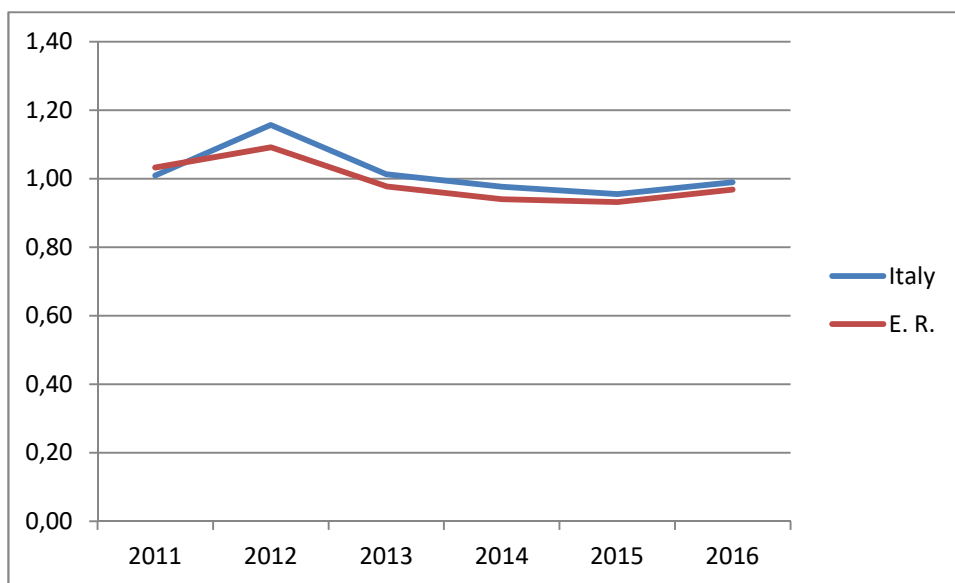
**Table 4. 2 – Emilia Romagna fertility rate**

	2012	2013	2014	2015	2016
<b>Extremadura</b>	1.27	1.22	1.29	1.28	1.30
<b>Spain</b>	1.32	1.27	1.32	1.33	1.34
<b>Italy</b>	1.43	1.39	1.37	1.35	1.34
<b>País Vasco</b>	1.35	1.30	1.38	1.39	1.39
<b>Emilia-Romagna</b>	1.49	1.45	1.42	1.42	1.40
<b>Lombardia</b>	1.52	1.48	1.46	1.44	1.42
<b>Baden-Württemberg</b>	1.40	1.40	1.46	1.51	1.59
<b>Germany</b>	1.41	1.42	1.47	1.50	1.60
<b>France</b>	2.01	1.99	2.01	1.96	1.92

Source: Eurostat – Table elaborated by the author

Regarding the migration flow, Emilia Romagna shows the same descent pattern of Italy. Figure 4.2 shows that both of them registered the highest peak in 2012, with a number of 130,212 individuals (ISTAT) for E.R, followed by a reduction that touched the lowest in 2015 with 111.092 (ISTAT) individuals.

**Figure 4.2 – Migration transfer of residence (%) in Emilia Romagna and Italy 2011-2016**

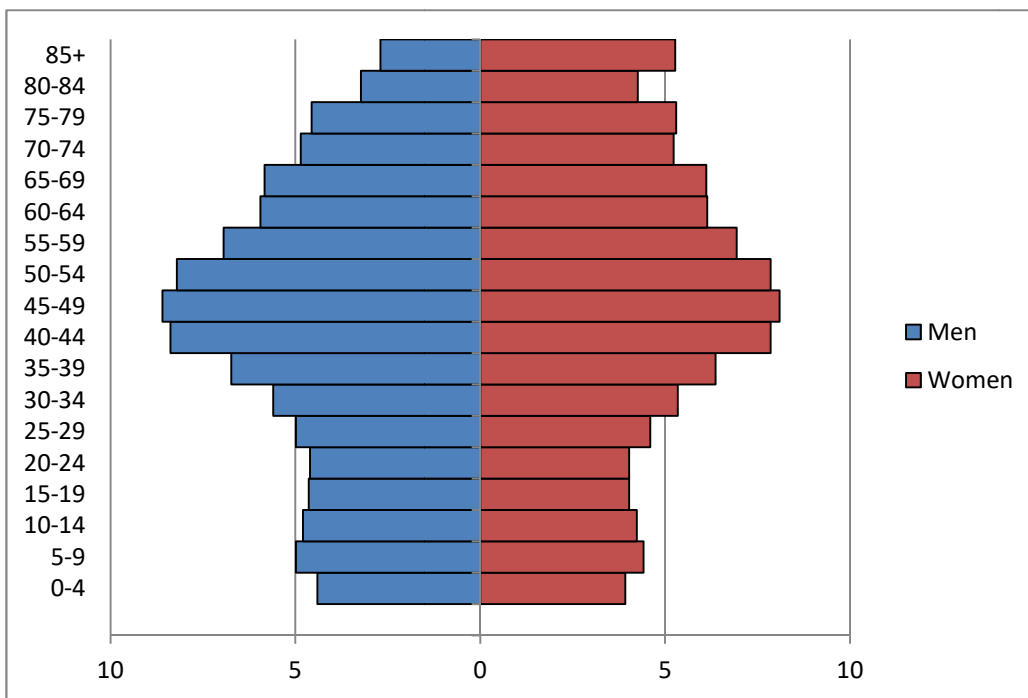


Source: ISTAT – Graph elaborated by the author

The composition of the population in figure 4.3 shows that the majority ranks between the 35 and 60 years of age. Nevertheless, in 2017 the part of the population that is considered ‘old’ almost equalized the youths. A significant indicator is the percentage of women above 85, which is higher than infants of the same sex.

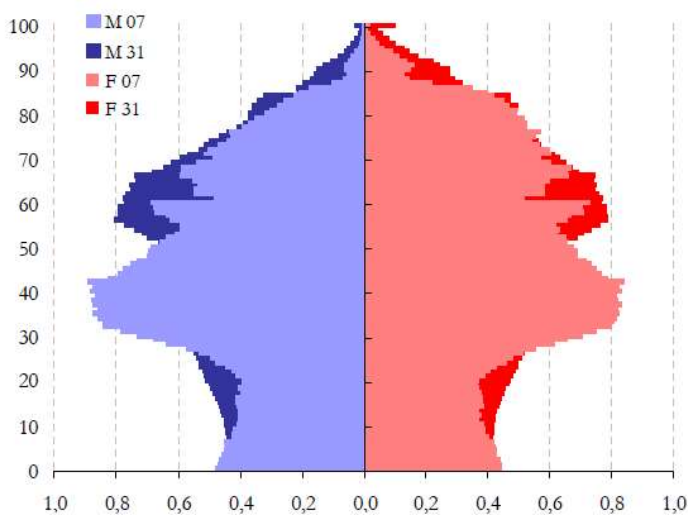
The projections for 2031 are not encouraging, in fact the aging trend is confirmed, because the part of the old population is increasing, whereas the young population is reducing, as figure 4.4 displays.

**Figure 4.3 - Population composition of Emilia Romagna 2017**



Source: Eurostat – Graph elaborated by the author

**Figure 4.4 - Population composition of Emilia Romagna in 2031 (projection)**



Source: "Regione Emilia Romagna, 2011 – Previsioni demografiche ISTAT 1.1.2007 – 1.1.2051: una prima analisi dei risultati relativi alla regione Emilia-Romagna", page 2

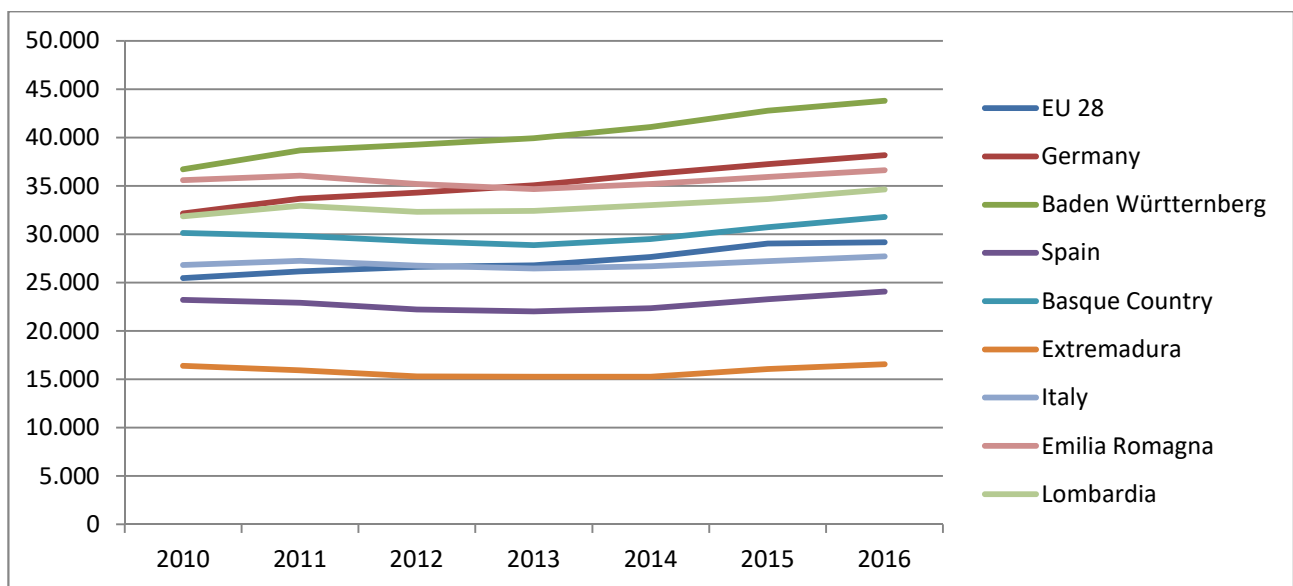
As far as the economy concerns, "Emilia-Romagna is a leading region in Europe in terms of entrepreneurship and economic dynamism. The active population in working age is more than the



70% of the labour workforce, and the women’s activity rate is the highest in Italy. The innovation ecosystem is characterized by 4 regional Universities and important national research organizations such as CNR (National Research Council), ENEA (National Agency for Energy, Environment and Sustainable Innovation), INFN (National Institute for Nuclear Physics)”(European Commission, 2010c).

E.R had in 2016 a regional GDP of 153,997 million euro, which had been growing since 2010, passing from 138,755 million (Eurostat) to the value of 2016. The per capita GDP is attested to be one of the highest in Europe. Figure 4.5 shows that Emilia Romagna’s per capita GDP (36.603 euro) is far higher than EU 28 average and national one (27,719). In addition, it is also higher than Extremadura’s and The Basque Country’s per capita GDP, which after a little reduction and stagnation from 2012 and 2014, has restarted to grow.

**Figure 4.5 - Per capita GDP variation 2010-2016**



Source: Eurostat – Graph elaborated by the author

The unemployment rate is one of the lowest in Italy. Table 4.3 shows that the unemployment rate has been descending since 2013, passing from 8.4% to 6.6% of 2017, which was lower than the 11.2% of Italy and the 7.6% of the EU, as well as less than Extremadura’s and The Basque Country’s ones. This remarks the dynamism and the strengths of the regional economy.

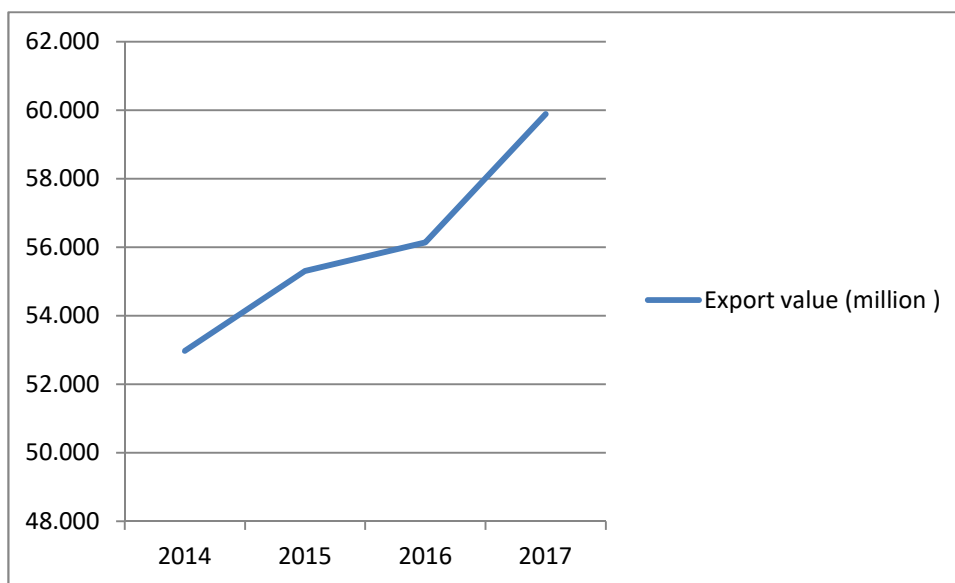
**Table 4.3 – Emilia Romagna unemployment rate trend 2013-2017**

	2013	2014	2015	2016	2017
<b>Baden-Württemberg</b>	3.4	3.1	3.1	3.1	2.9
<b>Provincia Autonoma di Bolzano/Bozen</b>	4.4	4.4	3.8	3.7	3.1
<b>Germany</b>	5.2	5.0	4.6	4.1	3.8
<b>Provincia Autonoma di Trento</b>	6.5	7.0	6.8	6.9	5.7
<b>Veneto</b>	7.6	7.5	7.1	6.8	6.3
<b>Lombardy</b>	8.0	8.2	7.9	7.4	6.4
<b>Emilia-Romagna</b>	8.4	8.4	7.8	7.0	6.6
<b>Friuli-Venezia Giulia</b>	7.7	8.0	8.0	7.6	6.7
<b>European Union</b>	10.9	10.2	9.4	8.6	7.6
<b>Valle d'Aosta</b>	8.3	8.9	8.9	8.7	7.8
<b>Tuscany</b>	8.7	10.1	9.2	9.5	8.6
<b>Piedmont</b>	10.6	11.3	10.3	9.4	9.1
<b>Umbria</b>	10.3	11.3	10.5	9.6	10.6
<b>Marche</b>	11.0	10.1	10.0	10.6	10.6
<b>Lazio</b>	12.0	12.5	11.8	11.2	10.7
<b>Italy</b>	12.2	12.7	11.9	11.7	11.2
<b>The Basque Country</b>	16.6	16.3	14.8	12.6	11.3
<b>Abruzzo</b>	11.3	12.6	12.6	12.1	11.7
<b>Basilicata</b>	15.3	14.7	13.7	13.3	12.8
<b>Sardinia</b>	17.5	18.7	17.4	17.3	17.0
<b>Apulia</b>	19.8	21.5	19.7	19.4	18.9
<b>Campania</b>	21.5	21.8	19.8	20.4	20.9
<b>Sicily</b>	21.0	22.2	21.4	22.1	21.5
<b>Calabria</b>	22.3	23.5	23.0	23.2	21.6
<b>Extremadura</b>	33.9	29.8	29.1	27.5	26.3

Source: Eurostat – Table elaborated by the author

The region has strong industrial sectors such as those “linked to mechanical engineering and automotive. Most of the traded products are sport cars and motorcycles, agricultural machines, shipbuilding industrial automation and robotics, food processing and food packaging, as well as agri-food, construction materials and technologies medical equipment.”(European Commission, 2010c) The region has a high propensity to export, which represent almost the 37% of the entire regional GDP. Figure 4.6 shows the value of export in the period from 2014 to 2017. It is interesting to notice how it has steeping grown in the last four years, rising for more than the 13% from 2014, and reaching the total value of 59,881 million euro in 2017 (ISTAT)

**Figure 4.6 – Emilia Romagna export value trend 2014-2017**



Source: ‘Istituto Nazionale di Statistica’, 2018 – graph elaborated by the author

The regional Innovation Scoreboard classifies Emilia Romagna as a ‘moderate innovator’ by assigning a score of 79.9, considering a score of 0.403 in EPO patent application, 0.447 in scientific co-publication, and 0.478 in product or process innovators. (see database, ‘European Commission’, 2017)

Regarding the R&D expenditure, table 4.4 shows that in 2015 it was only the 1.79% of the regional GDP. Nevertheless, even though it is below the E.U’s average and far behind the 3% recommended by the European Commission, the R&D expenditure has increased since 2011, showing a general improvement and attention by the region about investing on it. Moreover, among Italian regions, E.R. attested to be one of the most performing, better than the national’s average. The table shows a general contraction with respect to R&D expenditure, with the only exceptions of Emilia Romagna and Murcia. However, among the three regions analyzed in this dissertation, The Basque Country is still the region that most invests in R&D.

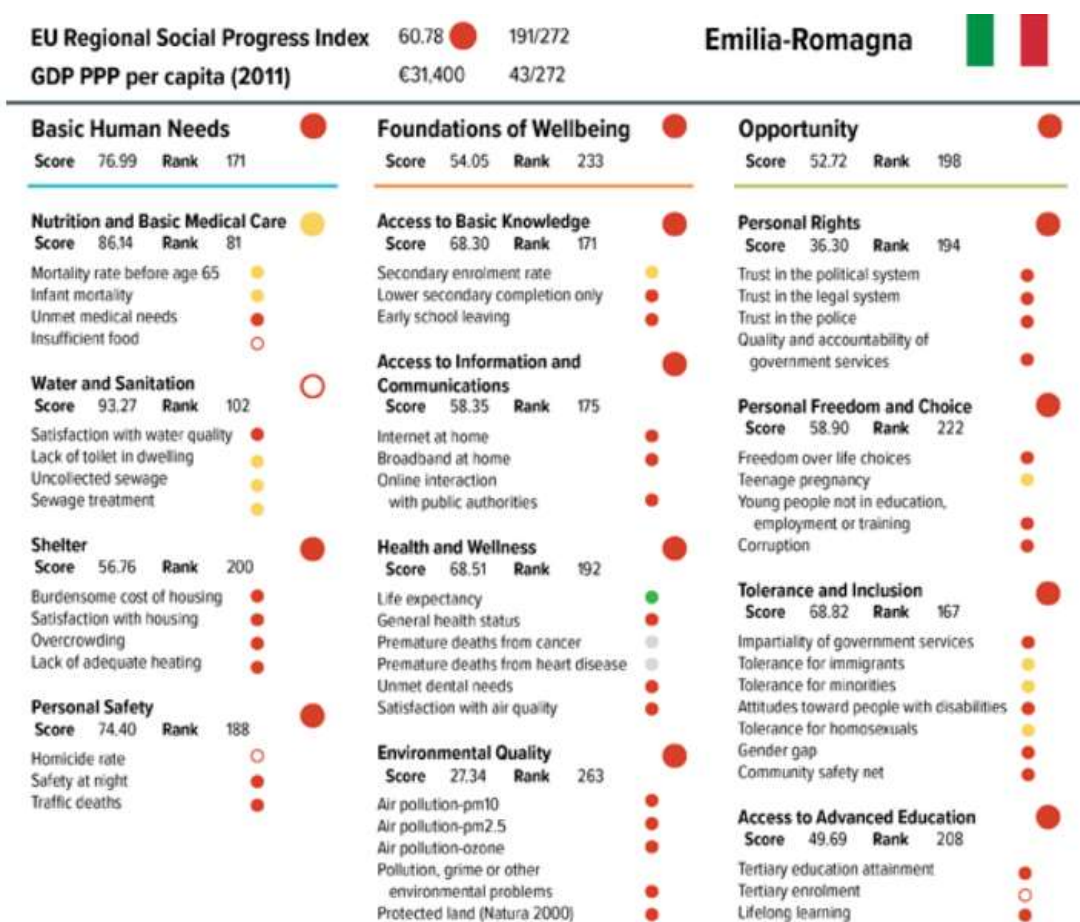
**Table 4.4 – R&D expenditure (% of regions' GDP) 2011-2015**

	2011	2012	2013	2014	2015
Germany	2.8	2.87	2.82	2.87	2.92
Piedmont	1.85	1.96	1.98	2.19	2.16
European Union	1.97	2.01	2.02	2.03	2.04
The Basque Country	2.14	2.24	2.12	2.04	1.91
Provincia Autonoma di Trento	1.73	1.82	1.83	1.81	1.8
<b>Emilia-Romagna</b>	<b>1.42</b>	<b>1.61</b>	<b>1.64</b>	<b>1.7</b>	<b>1.79</b>
Lazio	1.53	1.61	1.66	1.63	1.6
Friuli-Venezia Giulia	1.48	1.48	1.5	1.54	1.59
Liguria	1.34	1.35	1.32	1.37	1.45
Italy	1.21	1.27	1.31	1.34	1.34
Tuscany	1.19	1.26	1.28	1.3	1.31
Campania	1.13	1.23	1.31	1.27	1.28
Lombardy	1.27	1.31	1.32	1.29	1.27
Veneto	1.03	1.06	1.12	1.07	1.11
Apuglia	0.7	0.76	0.83	0.99	0.99
Isole	0.8	0.81	0.86	0.99	0.95
Abruzzo	0.81	0.81	0.87	0.96	0.92
Marche	0.75	0.81	0.82	0.86	0.84
Provincia Autonoma di Bolzano/Bozen	0.6	0.55	0.63	0.71	0.75
Calabria	0.45	0.52	0.54	0.79	0.7
Valle d'Aosta/Vallée d'Aoste	0.56	0.46	0.42	0.48	0.69
Extremadura	0.82	0.76	0.77	0.7	0.68
Basilicata	0.56	0.53	0.54	0.57	0.66
Umbria	0.86	0.87	0.84	0.96	:
Molise	0.44	0.44	0.77	0.66	:

Source: Eurostat – Table elaborated by the author

On the side of the wellbeing, Emilia Romagna receives a really negative score by the European Social Progress Index. In fact, figure 4.7 shows that E.R has a rank of 191/272 with very negative punctuations in almost all indicators. That means that regarding basic human needs, foundations of wellbeing and opportunity, citizens do not have many possibilities and the region has to invest more in order to face these regional issues. Among the worse indicators E.R. receives a score of 222/272 on Personal Freedom and Choice and a score of 263/272 on Environmental Quality, placing almost at the bottom of the rank. This last score is mostly related to air pollution. In fact, due to its geographical features and being an industrial region, E.R is one of the most polluted area in the E.U.

Figure 4.7 - European Regional Social Progress Index for Emilia Romagna



Source: 'European Social Progress Index', 2018

## 4.2 Emilia Romagna's RIS3

The Smart Specialisation Strategy of Emilia Romagna, called “Strategia Regionale di Ricerca e Innovazione per la Specializzazione Intelligente – RIS3ER”, is a 332 pages document, which is composed by the strategy and three different attachments, which represent more than the 70% of the entire document. The strategy, published in 2016 by the regional government in collaboration with ASTER agency, aims to “make Emilia Romagna a more dynamic and competitive region in order to generate and foster employment and economic development.”(Regione Emilia Romagna, 2016) In addition, as second objective, the strategy purposes to “enhance and evolve the productive system.”(Regione Emilia Romagna, 2016) For doing it, the region has set five main priorities:

- Stabilisation and strengthening of the innovative potential and productive systems

- Enhancement and development of new productive system with high growth potential
- Raise of the production
- Structural strengthening of the productive system through innovation

For its implementation, the strategy bases on four methodological elements:

- Structural strengthening
- Technology foresight
- Entrepreneurial discovery and cross-fertilization
- Governance (Regione Emilia Romagna, 2016 – Strategia Regionale di Ricerca e Innovazione per la Specializzazione Intelligente – RIS3ER, pages 4,14,15)

Emilia Romagna has set five areas of specialisation: ICT, sustainable construction, mechatronics, healthy living services and agri-food. In table 4.5, the priorities are briefly summarized.

**Table 4.5 – Emilia Romagna Smart Specialisation priorities**

<b>Priority</b>	<b>Economic Domain</b>	<b>Scientific Domain</b>	<b>Policy Objective</b>
<b>ICT</b>	Information and communication technologies	Culture, recreation, religion and mass media	Cultural and creative industries
<b>Sustainable construction</b>	Construction	Environment, transport, energy	Sustainable innovation, KETs
<b>Mechatronics</b>	Manufacturing, wholesale and trade	Industrial production technology, engineering science	Digital transformation, KETs
<b>Healthcare</b>	Human health and social work activities, manufacturing	Health, industrial production and technology	Digital transformation, KETs
<b>Agri-food</b>	Agriculture, forestry and fishing	Industrial production and technology, Agriculture	Sustainable innovation, KETs

Source: ‘Eye@RIS3 - Smart Specialisation Platform’, 2018 - Table elaborated by the author.

The first priority, ICT, aims to a cross-sectoral innovation. Therefore, ICT will be used in “new technologies for tourism, for the diagnosis, recovery, management and enhancement of cultural and environmental resources.” (‘Eye@RIS3 - Smart Specialisation Platform’, 2018).

Sustainable construction instead, aims to create “new construction materials and building techniques for sustainable construction, building redevelopment, smart buildings and cities.” (‘Eye@RIS3 - Smart Specialisation Platform’, 2018).

Mechatronics focuses to develop “new technologies and materials for the motor industry, automated systems, smart and sustainable manufacturing, intelligent transport systems.” (‘Eye@RIS3 - Smart Specialisation Platform’, 2018)

Healthcare targets to create “new technologies and medical devices to improve patient care, diagnosis and treatments, as well as regenerative medicine and digital transformation for healthcare.” (‘Eye@RIS3 - Smart Specialisation Platform’, 2018)

Finally, agri-food aims to “produce healthy and safe food products with minimised environmental impact with zero waste and adequate societal value. In addition, it invests on sustainable agriculture, nutraceuticals, smart supply chain and innovative packaging.” (‘Eye@RIS3 - Smart Specialisation Platform’, 2018)

#### **4.3 Emilia Romagna’s RIS3 assessment**

The tables below correspond to the evaluation of the eighteen priority areas, by scanning the RIS3 of Emilia Romagna according to the tables of section 1.3.1.

**Table 4.6 – STEP 1 Regional context and potential for innovation**

Priority area	RIS3 references	Marks	Comments
<b>Regional assets</b>	Pages:6-8;15-26;78-81;87-302;169;216; emiliaromagnastartup	4,5	There is an excellent in depth-description and presentation the asset and research infrastructure mapping of the region, especially through the emiliaromagnastartup portal. The SWOT analysis is poor and misses of additional commentaries and explanations. For each area of excellence a good description and analysis about the economic context, industries and index of specialisation is provided. There is a good sectoral analysis by the identification of the areas of excellence, the trade activities, the well established activities and the new emerging activities. The region provides a good analysis of the economical specialisation by describing in detail the main activities and the types of industries that are leading the sector.
<b>Beyond regional boundaries</b>	Pages:6-9;15-28; 45-46; 53-54;	4	Regarding the benchmarking activity the region provides a deep examination of its specialisation indexes by making an excellent assessment related to the priority areas. E.R. not only analyzes the grade of specialisation and the position of the region in relation with Italian and European economy, but also assesses the employment context, the inter-sectoral situation and the export capability. Thus, it measures the linkages of goods and services. In addition, it provides a ranking about it share of specialisation per sectoral activity. Nevertheless, Emilia Romagna does not furnishes tables or graphs of comparison with other regions, but provides a map of potential partner per economic activity, examining also the interregional collaboration potential. In addition, it analysis the interregional cooperation of the region regarding polices about clusters, innovation and research activities. For the researcher activity, Emilia Romagna is fostering the mobility of personnel and researcher by the "Tecnopoli" framework in order to underpin the collaboration and contact between them.
<b>Entrepreneurial discovery</b>	Pages: 9-26; 32-44; 70-71; 82-302	4,5	The majority of the EDP is contained in the development of the areas of specialisation. The region carries out an excellent process



		<p>of discovery by deeply assessing the context of each area of specialisation. It also defines the trajectory of evolution and development, where, areas of greatest future development are hidden. Moreover, it makes an analysis of feasibility and describes the motivations of the choices. The actors involved and the working group are listed. However, the description about the latter and the working pattern are not present. The region displays the scientific production indicators referred to citations, R&amp;D activity and patent rate. The EDP activity the region is really deep and wide. It analyses for each of the four strategic priorities the current situation, the specialisations and the areas of greatest future potential development. In addition, it declines the strategic priorities for the areas of specialisation, by identifying the niches and the competitive advantages the region has, as well as the regional entrepreneurial environment, by making a sort of context assessment. Furthermore, by this analysis the region draws a sort of foresight by making a technology study (ERVET study) and identifying the future aims, the current challenges and the possible renewal and transformation path of the region. However, the information is condensed and summarized by not mentioning the actors involved or not describing the meetings held with stakeholders. The greatest amount of information is left in an external document which is not described in the strategy.</p>
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Source: table elaborated by the author

**Table 4.7 – STEP 2 Governance**

<b>Priority area</b>	<b>RIS3 references</b>	<b>Marks</b>	<b>Comments</b>
<b>Quadruple helix engagement</b>	Pages:32-44;61-62; 70-71; 84-85; 122-123;163-164;210-211;258-259;301-302	<b>3</b>	Regarding the quadruple helix engagement the information provided is poor and insufficient. The strategy deeply analyzes the areas of current and future excellence and competitive advantage, as well as the actions which are needed to be taken. However, the strategy does not speak about the involvement of the business community and the quadruple helix and it does not mention the actors involved. The region briefly describes the forums and the actions taken to involve the delegates of the sector champions and the business community, such as regional forums, rounded tables for growth, but the explanation is poor. The description about the working group is provided just at the end of the wide description of the priority areas. Moreover, there is only a list about the actors and delegates involved without an in-depth analysis about their roles, responsibilities and typologies. Thus, there is almost no reference about boundary spanners, sector champions, business actors . The strategy skips to talk about the actors involved.
<b>Governance structure definition</b>	Pages: 60-62	<b>3,5</b>	The governance of Emilia Romagna assumes different facets with respect to the traditional governance. In order to furnish a capillary coordination on the ground, the region displays different actors and activities such as collaborative platforms or forums in order to perform and check the governance structure. Each actor has a specific tasks and role which are defined, however, the three main bodies of the governance are not clear. The steering group is the region with its secondary bodies such as ASTER and ERVET, the management team is the "Rete regionale dell'Alta Tecnologia" and the working group are the secondary bodies such as the Laboratory for internationalisation. The region shows off a real and good commitment about providing concrete actions and deploying different bodies in order transform and improve the governance of the region for the S3, by also carrying out concrete and real actions for supporting the governance of the overall strategy. Nevertheless, for the latter, their relevance in the governance structure is not clear.
<b>Multi-fund approach</b>	Pages:55-58; 62; 72-77;329-331	<b>3,5</b>	The strategy capillary identifies different funding streams. There is an identification of the specific amounts available to different

		<p>budgetary sources which are different from the traditional S3 funding sources. The region well determines the amounts available and the sources that will be deployed for the S3. For each amount, a specific action to be financed is outlined. In addition, there is a budgetary estimation about the overall expenditure for the 2015-2020 period, which takes into consideration different budgetary streams such as different regional and departments funds Horizon 2020 funds , private and public funds. In addition, the region sets out different actions and intervention to support R&amp;D and start ups, such as innovative financing instruments. However they are just mentioned as possible future actions and they are not described. The region provides a table with synergies between different funding streams regarding each of the five areas of specialisation. The strategy seems to be aligned with national and European objectives. There is an explanation about the characteristics of Emilia Romagna's RIS3 and its alignment with the regional and European strategies, such as those related with the National Technologic Clusters. By the way, the information is really resumed.</p>
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Source: table elaborated by the author

**Table 4.8 - STEP 3 Overall vision for the future of the region**

Priority area	RIS3 references	Marks	Comments
<b>Depict a regional scenario</b>	Pages: 4-14	<b>4</b>	<p>The region provides a good depiction of the regional scenario. E.R describes the current context of the region and makes a good analysis about the regional features and potentials. Moreover, it well outlines the objectives and the importance of the S3 priorities in order to make the region more competitive and foster innovation. There is not a specific mention about Europe 2020 features, however, the region well identifies its strengths and features, by also drawing a good picture of the asset and the renewal and transformation path embarked. The region can be identified between an industrial production zone and a knowledge region. In the vision E.R. underlines this transition path the region have been embarking in the last years. Moreover, E.R. is a urban-coastal region with population growth and inflows. Regarding the international perspective E.R. is one of the reference regions in Europe and can be considered between an S&amp;T intensive production region and a knowledge intensive region, building on current advantages. For the connectivity degree, E.R can be considered as a deepening pipelines region.</p>
<b>Create a common and clear vision</b>	Pages: 4-14; 26-27; 87-302	<b>4</b>	<p>The region clearly states the project and dream of the RIS3 by defining two main objectives, which are building a more dynamic and competitive environment and promoting the evolution of the productive system. In addition, the region well describes the renewal and transformation path embarked by defining different steps that should be pursued and accomplished. E.R well illustrates the societal challenges that have to be faced such as the strengthening of services and innovation, the urban areas development, and the cooperation with other regions. In addition, the region identifies the objectives and the innovative orientations which lead the design of the strategy by identifying four priority areas (horizontal and cross-sectoral) and five areas of specialisation which constitute the pillars of the productive and innovative system of E.R. as well as the competitive advantages. Moreover, within the development of the areas of specialisation , the region reports the benefits and opportunities, as well as possible evolutionary trajectory that the investments on</p>

			such specialisation s may produce.
<b>Communication strategies</b>	Pages: 10-15;60-62	2,5	The region does not give much space about the description of the communication strategies. The information provided is very little, therefore, the region just briefly mentions some communication tools such as institutional channels, web-portals and specific communication initiatives. There is almost no identification of target groups for the communication strategies and there is not any planning about the involvement of the citizenship. The forums for the definition of the priorities and the quadruple helix engagement, as well as the working tables are the only instruments described. Even though the region does not identify any relevant communication tools in the definition of the vision, it clearly states the goals of the strategy and it well places itself in the national and European context.

Source: table elaborated by the author

**Table 4.9 – STEP 4 Identification of priorities**

Priority area	RIS3 references	Marks	Comments
<b>Innovation and Research priorities</b>	Pages: 14-44; 72-85	<b>5</b>	<p>There is an absolutely great analysis regarding the priority areas. The region identifies the horizontal and the vertical priorities. For the choice of the specialisations, the region carries out a great, long and wide assessment by analyzing in the detail implications, impacts, feasibility, foresight, niches and innovation potential, regarding each priority areas. The region provides a great assessment regarding the context in relation with each areas of specialisation. The strategy evaluates the level of specialisation by also analyzing the export capacity, the inter-sectoral complexity, the employment relevance, and the capacity to face new challenges. Furthermore, the region well determines the areas that show better competitive advantage and where the region can excel. Moreover, the region identifies possible actions to be taken in order to develop the areas of specialisation. The information provided is really exhaustive and shows a great commitment of the region. In addition, within the definition of the priority areas, the region extensively motivates the choice about the priority areas, by analyzing the strategic priorities and making a determination of the environment in which it operates. Hence, it pauses on the challenges the region has to face during the development of the priority areas and the definition and implementation of S3. The region relies on the extroversion analysis in order to select the priority areas. The strategy also sets up and describes the criteria for the selection of the trajectories of innovation. Finally, E.R. delineates the strategic objective by defining seven point which resume and support the choice. The region really makes a great assessment not only selecting the areas that have the greatest impact, but also taking in consideration the objective of the region, the structure, the potential, the current and the future situation, as well as the key elements for the path of innovation and transformation.</p>
<b>Development of priority areas</b>	Pages: 14-32; 82-302	<b>5</b>	<p>The development of the priority areas comprehends more than the 70% of the entire document. The region provides and extremely extensive, exhaustive and wide description about the development of the priority areas, by analysing one per one all specific trajectories</p>

			<p>and sub-priorities related to each priority area and specialisation. Agrifood, building and construction, mechatronics, cultural and creative industries, health and wellness, are composed by several sub-categories which are singularly analyzed. In the development, the region describes and motivates the choices by making a sort of context and environment assessment. Moreover, it analyses the future trajectories, challenges and implication that the region wants to achieve, which are part of the structural change. Furthermore, E.R. makes an analysis of feasibility for each sub-category. At the end of each area of specialisation, Emilia Romagna provides a series of correlation matrix considering KETs, Horizon 2020 challenges and regional Megatrends. Hence, it draws exhaustive conclusions and recommendation for future orientation. In some cases the assessment of the feasibility is provided by a SWOT analysis.</p>
<p><b>Innovation Delivery Instruments</b></p>	<p>Pages:14;20-21; 25;29-32;34; 38-41;45;75;120-121;124;127; 134;137;152;155; 161-162;207-208;255-256; 262-296</p>	<p>5</p>	<p>The description of the digital agenda is extended. The strategy provides a benchmarking analysis with other EU regions. Moreover, it widely explains the context situation, the assets and the digital infrastructures. Thus, E.R. makes an analysis about ICT use in population, public administration and enterprises, by also displaying an extended SWOT analysis regarding digital growth. The priorities of digital agenda are explained by furnishing a budget estimation and a list of resources streams to be used in S3. Finally, the strategy furnishes an assessment regarding the monitoring and evaluation activity for digital agenda. KETs are mentioned several times. In the development of priority areas a matrix of correlation for its use is always provided at the end. Therefore, there is wide use of KETs in E.R. strategy. They are defined as key elements for the innovation of the productive system, so their use and necessity is explained in the strategy. In addition KETs permeates almost all document, therefore, even though there is not a specific section where they are explained, their presence and mention is frequent and they compare in each priority area, being seen as drivers for innovation. Cultural and creative industries are one of the areas of specialisation of the region. Therefore, they are extensively described by explaining their sectoral context, their impact and underlying in detail the possible development trajectories of that priority. In the latter E.R. motivates the</p>

		<p>relative choices, describes the potential niches and makes an assessment of feasibility. The public procurement is briefly mentioned in the strategy. It is used as innovative delivery instrument in the policy mix (e-procurement) and it is described among the concrete actions the region wants to perform. However, little of information is provided. Social innovation is especially developed in priority area B, which consists in health and wellness and cultural and creative industries. Therefore, social innovation lays on the background of the priority areas and areas of excellence, because most of the competences displayed and areas selected are permeated by social innovation. Social innovation constitutes a central pillar in the definition of the strategy. Although green growth is not independently described, it permeates most of the priority areas, specialisations and niches. Therefore it constitutes a central delivery instruments. Most of the areas of specialisation relies on green growth for the development of new materials, new processes and activities. The majority of the actions and trajectories regarding green growth consider sustainable materials, eco-innovations, green energy, change in processes and green economy.</p>
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Source: table elaborated by the author



**Table 4.10 – STEP 5 Definition of policy mix and action plan**

Priority area	RIS3 references	Marks	Comments
<b>Composition of the policy mix</b>	Pages: 44-58; 78-81	5	The region displays a wide series of innovation delivery instruments. They are not just described, but they are precisely declined according with the four priority areas, and grouped in ten thematic. The description and the analysis is excellent, really extended and well described. Each thematic contains other sub-thematic in which the instruments are explained and listed. There is an absolutely wide deployment of various instruments, which target almost every area such as innovation, new enterprises, internationalisation, training and talent recruitment, investments attraction, interregional collaboration and economic analysis. There are numerous actions the region is going to take in order to perform and use the instruments deployed. There are all types of instruments, such as traditional and emerging instruments, knowledge generation, diffusion and exploitation instruments, global, regional and individual target instruments. In addition, the region sets up different programmes, projects and innovative actions such as the SPINNER subsidy, the WETECHOFF incubators, the spin-off portal. The region shows a good commitment in order to give concrete support to the implementation of the strategy.
<b>Action Plan</b>	Pages : 44-58	4	The action plan is developed within the definition and explanation of innovation delivery instruments. It is not presented as a sequence of different lines of action which aim specific targets and objectives, but it is presented by deeply describing each instrument, programme and trajectory defined for the implementation of the strategy. The region well justifies and explains motivations, actions, programmes and projects, by assessing and defining the impact, the actors involved and their responsibilities, the strategic objectives and goals, the intervention and development trajectories, the future and current implications. There is no reference about timeframes and just a little about measurable targets, which are mostly out looked. In addition, the strategy provides a brief description about the economical and structural analysis of the action plan as well as possible future actions needed to be taken in order to continue the monitoring activity. Finally, there is an identification of the funding sources deployed

			for financing the innovation delivery instruments described.
<b>Pilot projects</b>	Pages: 54;156;323	1	Pilot projects are mentioned just three times as possible actions to be taken as experimental instruments for the strategy. However, the strategy does not furnish any relevant information about their impact, their definition and development, their relevance with respect to S3 priorities.

Source: table elaborated by the author

**Table 4.11 – STEP 6 Monitoring and evaluation**

<b>Priority area</b>	<b>RIS3 references</b>	<b>Marks</b>	<b>Comments</b>
<b>Indicators</b>	Pages: 58-60	2	The indicators are divided in categories, such as strategy indicators, transition indicators, and leverages. The region displays different measurements needed to be taken regarding each indicator's category. Nevertheless, there is no indication about timeframes, targets and baselines. In addition, they are not explained but just listed. The information is very poor and it is hard to understand which is the target the region wants to achieve, the time and modalities. The information is insufficient and the indicators should be better explained and developed. No presence about context indicators, output and results indicators.
<b>Objective and expected results</b>	Pages: 58-60	0,5	The description of monitoring activity is extremely short. There is no indication about aims, outputs, short, medium and long term results. The information provided is insufficient and it is almost impossible to understand objectives and expected results of the monitoring activity.
<b>RIS3 update</b>	Pages:58-62;124;164;212;260;303	2	The monitoring framework is extremely lacking. Regarding the actions related to the monitoring activity they are just little outlined, such as ex ante and ex post measurements. Furthermore, there is no indication about the frequency of the RIS3 update, and no identification about the bodies in charge of the monitoring activity, as well as their roles and responsibilities. The only indication about is the possible constitution of the City-Labs, in order to coordinate and monitor the intervention on the S3. The region has developed a peer-review, which is well made. The future and outward orientation are described in the final conclusion and suggestions of each area of specialisation, which help to define future and innovative paths of development and innovation, as well as enhance the current competitive position of the region.

Source: table elaborated by the author

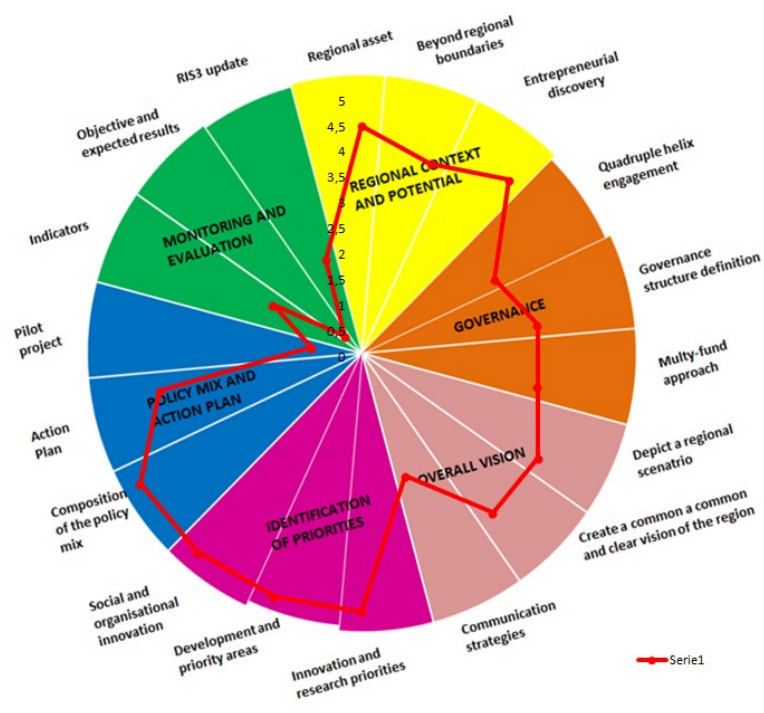
Table 4.12 – RIS3 Assessment Wheel 2.0 applied to Emilia Romagna’s RIS3 - Table

RIS3 Assessment Wheel 2.0 - Emilia Romagna		Insert marks between 0 and 5 in this column (half points i.e. 3,5 are possible)	The structure of this table is taken from the original Assessment Wheel, developed by Christian Saubliens, and modified by Filippo Damiani and Filippo Ferrarini based on the guidelines in the RIS3 Guide and in the Online S3.
RIS3 Steps	Priority Areas	Marks	Topics
<b>REGIONAL CONTEXT AND POTENTIAL FOR INNOVATION</b>	Regional assets	4,5	Regional context assessment Related variety analysis Differentiation patterns
	Beyond regional boundaries	4	Position of the region within the European and global economy Linkages of flows of goods, services and knowledge Interregional collaborations
	Entrepreneurial discovery	4,5	Areas of greatest future potential development Regional entrepreneurial environment assessment Foresight
<b>GOVERNANCE</b>	Quadruple helix engagement	3	Collaborative leadership building Boundary spanners Business community involvement
	Governance structure definition	3,5	Steering group Management team Working group
	Multi-fund approach	3,5	RIS3 budgeting Technical assistance funding National and RIS3 policy alignment
<b>OVERALL VISION FOR THE FUTURE OF THE REGION</b>	Depict a regional scenario	4	Identification of regional features Regional international perspective Connectivity degree
	Create a common and clear vision of the region	4	Mobilising power Renewal and transformational path Meeting social challenges
	Communication strategies	2,5	Definition of goals Identification of target groups Definition of communication tools
<b>IDENTIFICATION OF PRIORITIES</b>	Innovation and research priorities	5	Learning from the past Highest potential impact analysis Concrete and achievable objectives
	Development of priorities areas	5	Cross-sectoral priorities Horizontal priorities Priority areas presentation
	Innovation delivery instruments	5	KETs and Digital agenda Cultural and creative industries and innovative public procurement Green growth and social innovation
<b>DEFINITION OF POLICY MIX AND ACTION PLAN</b>	Composition of the policy mix	5	Traditional, emerging and experimental instruments Knowledge generation, diffusion and exploitation Global, regional or individual target
	Action plan	4	Definition of strategic objectives Definition of actors involved and targets Definition of timeframes
	Pilot project	1	Definition of the project Relevance with respect to RIS3 priorities Expected impact
<b>MONITORING AND EVALUATION</b>	Indicators	2	Result indicators Context indicators Output indicators
	Objective and expected results	0,5	Programme aims Outputs Short, medium, long-term results
	RIS3 update	2	Monitoring framework Peer review Orientation
ARITHMETIC MEAN		3,50	
ST. DEVIATION		1,39	
WEIGHTED MEAN		3,22	

Source: table elaborated by the author

Looking at table 4.12 it is possible to notice that the standard deviation is 1.39. There is great difference between the arithmetic mean and the weighted mean, the former scores 3.50 and the latter scores 3.22. This means that the composition of marks is not really homogeneous, in fact, there are great differences in the steps. Steps one and four are the most homogeneous, whereas the others show higher differences. Step six really worsen the average and steps three and five shows big difference in them. Nevertheless, looking at the final mark of the strategy, the punctuation the strategy is good, because even though marks are dispersed, the average is fine, therefore it is hard to state that it has been badly designed. However, for the calibre and magnitude of the region, the lacks identified, should be improved. The picture of the strategy in the form of spider graph is displayed by figure 4.8.

**Figure 4.8 - RIS3 Assessment Wheel 2.0 applied to Emilia Romagna's RIS3 – Spider graph**

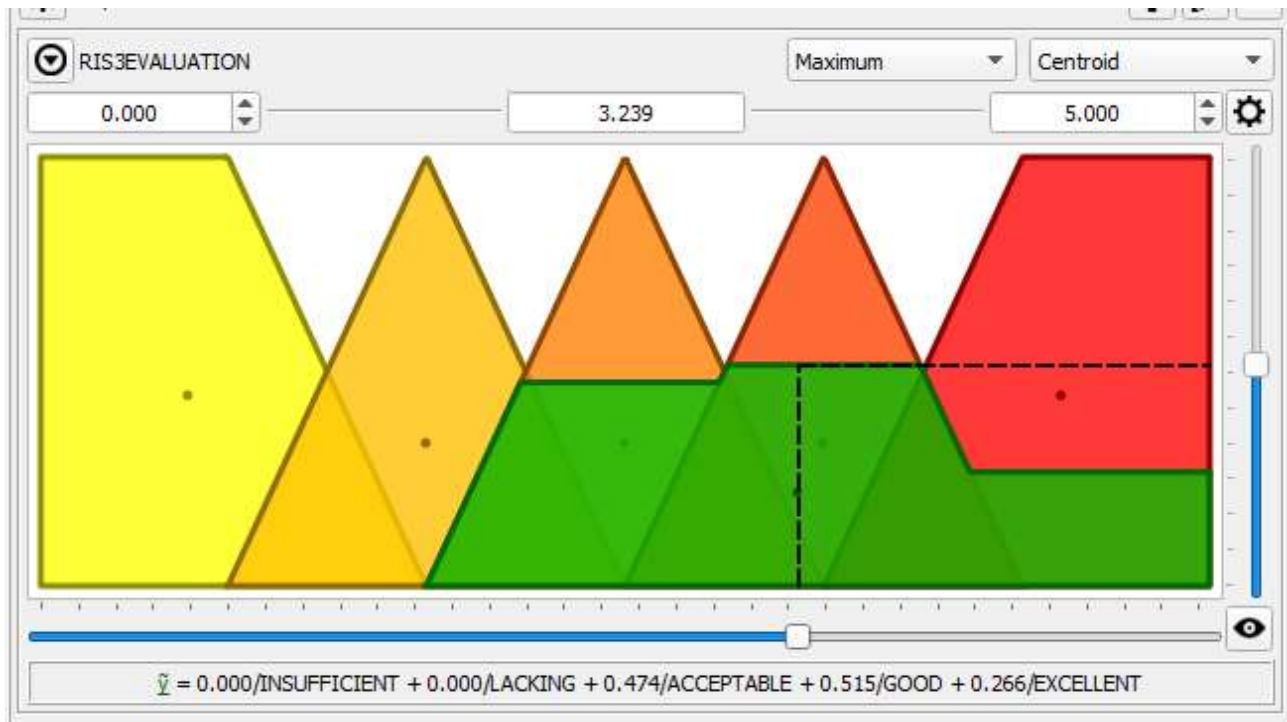


Source: graph elaborated by the author

Figure 4.8 confirms what the table displays. The red line shows a very dispersed strategy with different grades of development in the priority areas. The strategy well designs steps one “Regional context and potential” and four “Identification of priorities”, where the line runs along high and uniform punctuations, nevertheless the priority areas of the other steps show remarkable lacks. Step

six “Monitoring and evaluation” is not developed at all, thus the red line runs along very low marks; the other steps show great differences among the priority areas: step five “Policy mix” and step three “Vision” register irregularities with several ups and downs.

**Figure 4.9 – Emilia Romagna’s RIS3 fuzzy assessment**



Source: figure elaborated by the author

Figure 4.9 shows the assessment made by the Fuzzy logic. The strategy has received a qualitative judgement of “ACCEPTABLE” with a membership grade of 0.474, “GOOD” with a membership grade of 0.515 and an “EXCELLENT” with a membership grade of 0.266; the inference rules activated are 32 over 729. The output of the fuzzy logic is really meaningful because it presents three possible outcomes the strategy might lead to. There are probabilities that the RIS3 of E.R. brings to acceptable, good or excellent results. In this situation the fuzzy logic shows its usefulness, remarking the non-homogeneity of the strategy, because the green area lays on three different linguistic variables. Hence, it confirms the difficultness to foresight the possible consequences of Emilia Romagna’s RIS3. Taking into consideration what outlined above in the spider graph, even if the strategy has quite good marks as average, due to their different values there is uncertainty about the effect of the strategy. Therefore, policy makers should pay attention on the monitoring and evaluation phase because there are possibilities that the strategy might lead more to acceptable

outcomes, than to excellent ones, due to the higher membership grade of the linguistic variables. Hence, the achievement of the goals the region has set, might be reached with difficulties.

## **Chapter 5 – The comparative analysis of the RIS3s’ assessments**

Key words: Comparison, Comparative assessment

Now that the strategies have been singularly assessed, it is worthwhile to compare them in order to draw comments and consideration about the different strategies’ design. This is very important because the aim of this work is to analyze whether strategies realized by developed regions are better designed with respect to lagging regions, since the latter might not have the same capability and knowledge to design their own strategies. Furthermore, it is interesting to verify whether regions belonging to different context but having structural similarities, may develop similar strategies in term of quality.

In this chapter, the three final tables of the Assessment Wheel 2.0, the three spider graphs and the three fuzzy logic outcomes will be compared.

### **5.1 The Assessment Wheel 2.0’s tables comparison**

In this section the comparison of the tables of the Assessment Wheel 2.0 is carried out. It will be analyzed not only the composition of marks with the relative’s means and standard deviations, but also by juxtaposing the three tables, time will be spent to analyse which are the priority areas that have the highest and lowest average scores, in order to make considerations. In addition, the same procedure will be carried out for the single steps. The aim is to verify which is the step that is better developed on average and which is the one that is less developed. The tables are below presented.



Table 5. 1– RIS3s’ tables comparison

RIS3 Assessment Wheel 2.0 - Comparison		THE BASQUE COUNTRY	EXTREMADURA	EMILIA ROMAGNA		
RIS3 Steps	Priority Areas	Marks	Marks	Marks		Priority areas' mean
<b>REGIONAL CONTEXT AND POTENTIAL FOR INNOVATION</b>	Regional assets	5	5	4,5		4,83
	Beyond regional boundaries	4,5	5	4		4,50
	Entrepreneurial discovery	5	5	4,5		4,83
<b>GOVERNANCE</b>	Quadruple helix engagement	3,5	3,5	3		3,33
	Governance structure definition	5	4	3,5		4,17
	Multi-fund approach	5	3	3,5		3,83
<b>OVERALL VISION FOR THE FUTURE OF THE REGION</b>	Depict a regional scenario	4	3,5	4		3,83
	Create a common and clear vision of the region	4	4	4		4,00
	Communication strategies	2	3,5	2,5		2,67
<b>IDENTIFICATION OF PRIORITIES</b>	Innovation and research priorities	4	4,5	5		4,50
	Development of priorities areas	4	3	5		4,00
	Innovation delivery instruments	3	3,5	5		3,83
<b>DEFINITION OF POLICY MIX AND ACTION PLAN</b>	Composition of the policy mix	5	4	5		4,67
	Action plan	4	3,5	4		3,83
	Pilot project	1	0	1		0,67
<b>MONITORING AND EVALUATION</b>	Indicators	3,5	5	2		3,50
	Objective and expected results	3	4,5	0,5		2,67
	RIS3 uptade	3,5	4	2		3,17
ARITHMETIC MEAN		3,83	3,81	3,50		
<b>ST. DEVIATION</b>		<b>1,10</b>	<b>1,16</b>	<b>1,39</b>		
<b>WEIGHTED MEAN</b>		<b>3,61</b>	<b>3,57</b>	<b>3,22</b>		

Source: table elaborated by the author

Table 5.1 shows the comparison of marks of the three strategies. At first glimpse, it is possible to notice the different values of means. The overall judgement is positive because arithmetic and weighted means have high punctuations, therefore the strategies do not present severe lacks or issues. However, there are differences among them. The arithmetic means of The Basque Country and Extremadura are very similar, scoring 3.83 and 3.81, whereas Emilia Romagna registers an average of 3.50, due to the fact that the priority areas have lower marks. Looking at the standard deviation the situation changes. The Basque Country is the region that have the most homogeneous strategy, in fact its standard deviation value is 1.10, while Emilia Romagna is the most dispersed one, with a standard deviation of 1.39, the 26% higher than The Basque Country. This means that the strategy is not homogeneous at all, with high differences in the priority areas' values. Extremadura's standard deviation is in-between the other two, with a score of 1.16. Nevertheless, this affects the weighted means, hence the gap between Extremadura's and The Basque Country's weighted means is higher than the gap between the two arithmetic means, scoring respectively 3.61 and 3.57. Emilia Romagna's standard deviation really worsen its average score, in fact the weighted mean is 3.22, positioning the region at the last place. Among the three strategies is it possible to state that the strategy that is best designed in terms of average scores and uniformity is the one of The Basque Country, followed by Extremadura and Emilia Romagna.

Looking at the column at the left, it is possible to observe the priority areas' means. It is interesting to notice how the priority areas that on average have been better developed are: priority area one "Regional assets", priority area three "Entrepreneurial discovery" and priority area thirteenth "Composition of the policy mix", which score respectively 4.83, 4.83 and 4.67. In these areas, regions have shown high capability to describe their regional assets, to embark the process for discovering their regional potential and competitive advantage recommended by the S3, taking into account the quadruple helix, and to set the plan on how concretely implement what they have described in the strategy.

On the other hand, regions showed lacks in priority areas nine "Communication strategies", fifteenth "Pilot projects" and seventeenth "Objective and expected results". Regions have overlooked the communication strategies, not engaging enough the users community, and not spreading out information about the S3. They missed about advertisement strategies in order to share the vision and the significance of the Smart Specialisation. In fact, The Basque Country for example has underlined difficulties to engage citizens, who seem to be reticent about the S3. Pilot

projects is the priority area that scores less, hence regions have completely passed over to this task. This is a pity, because the RIS3 Guide recommends and encourages regions to carry out pilot projects since they “constitute the main tools for policy experimentation and allow testing unprecedented mixes of policy measures at a small scale, before deciding on implementation at a larger and more expensive scale.” (European Commission, 2012) Finally, objective and expected results underline the necessity for regions to revise their monitoring framework, above all what concerns the expected results that they desire the strategy might bring to regions. Hence, they should better reconsider the aim and objectives of their monitoring activity.

Moreover, looking at the colored circles, it is possible to notice how the 45% of priority areas scores four or more and the 39% scores between three and four, whereas only the 16% of the priority areas is below three. This means that on average the priority areas are well developed and the strategies are adequately designed, not showing severe issues. Now, in table 5.2 a focus on the steps is displayed.

**Table 5.2 – Steps comparison**

Steps' mean	The Basque Country	Extremadura	Emilia Romagna		Total average
Step 1	4,83	5,00	4,33		4,72
Step 2	4,50	3,50	3,33		3,78
Step 3	3,33	3,67	3,50		3,50
Step 4	3,67	3,67	5,00		4,11
Step 5	3,33	2,50	3,33		3,06
Step 6	3,33	4,50	1,50		3,11

Source: table elaborated by the author

Shifting the attention to the steps, it is possible to notice how the situation is a bit different with respect to the one previously described.

The Basque Country’s strategy confirms to be the better designed, in fact it has high marks in steps one and two, scoring always above three points and not showing any criticalities.

Extremadura instead shows differences with respect to the priority areas' average. Step five is the worse developed, scoring 2.50 only, whereas the priority areas showed, with the exception of Pilot projects, good and high marks (see table 5.1). Hence, Extremadura should revise this step and in particular the pilot projects. In addition, step six's average is really high with a mark of 4.50, whilst the priority areas' overall mean (table 5.1) showed problems with respect to it.

Eventually, Emilia Romagna confirms the trend of other regions in the first step, but it shows higher results in step four with respect to others two regions. In this step E.R. scores five, this means that the region has high capability in the definition, presentation and design of the innovation and research priorities. In fact the priority areas of this step have an average of five, whereas other regions have an average of 3.67. Hence, E.R. might have higher capacity to discover and present the areas and niches where the region has possible competitive advantages. However, the region shows severe issues in step six, which scores 1.50. This means that the region has to catch up and absolutely re-design its monitoring and evaluation framework, because the structure, the indicators and the RIS3 update are poorly developed and ought to be improved.

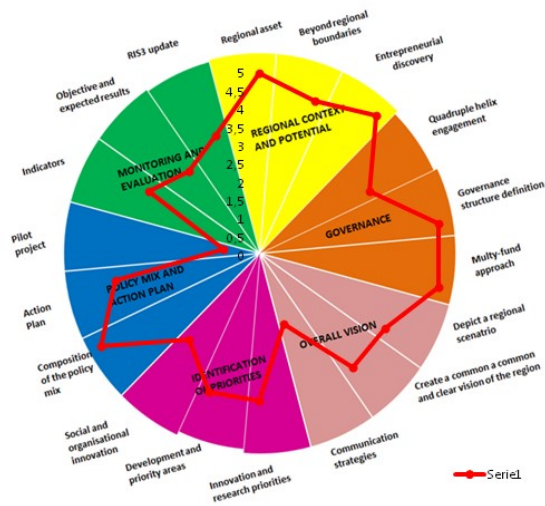
Considering the overall average, step one is the best designed; regions show good capability in defining the position of the region in the European Context, in the identification of regional assets and potential and embarking the EDP process. Nevertheless, even though the mark is acceptable, step five is the one that is the worse developed. Although policy mix and action plan's priority areas have high marks, the pilot projects really affect the total value of the step, bitterly worsening it.

## 5.2 The spider graphs comparison

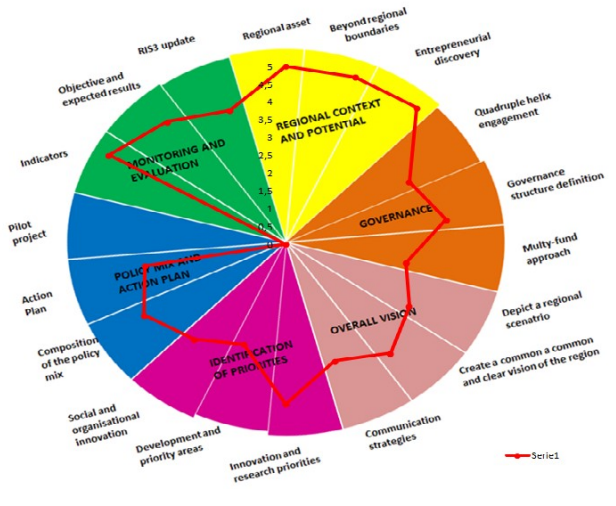
After having compared the priority areas and the steps that compose the strategies, now it is time to have a look at the spider graphs, which condense the information of tables in one visual modality.

Figure 5. 1– Regions’ spider graphs

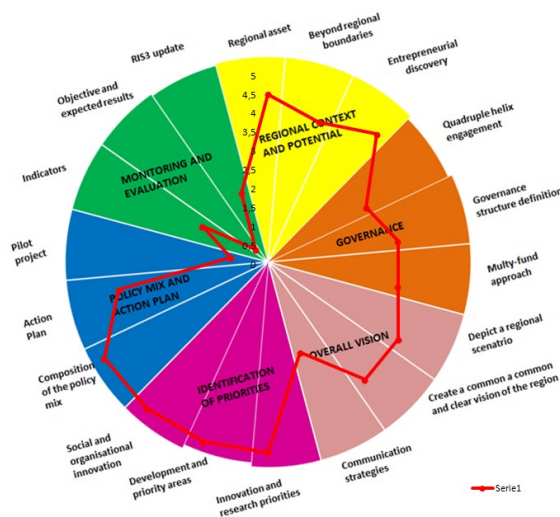
The Basque Country’s spider graph



Extremadura’s spider graph



Emilia Romagna’s spider graph



Source: graphs elaborated by the author

Figure 5.1 display three different situations. First of all the spider graph of The Basque Country is a bit irregular, in fact the red line has some up and downs especially in the “policy mix” and in “identification of priorities”, where it also registers a down peak in the pilot projects, while in the other four steps the red line is more uniform and runs along high punctuations. Monitoring and evaluation is uniform but the marks are low. Criticalities are showed as previously stated in the communication strategies, in the pilot projects and in the whole step six.

Extremadura at first glance shows high potential in the first and six steps, where the red line is very high. However, from step two, the red line descents to lower marks, passing through several up and downs, due to higher standard deviation, for revealing a serious lower peak in the pilot projects. However, the strategy is well designed and there are not really remarkable criticalities. Step four is the only step that should undergo to an improvement, hence Extremadura have to revise its priority definition and areas of specialisations.

Emilia Romagna’s spider graph is the most irregular one. The strategy is not uniform because the red line is really high in the first, fourth and fifth steps, but it is really low in steps two and six. The latter is extremely poor and all three priority areas that compose it are badly developed, thus the region must undergo to a revision and improvement of the monitoring and evaluation phase because it shows severe criticalities. In addition, pilot projects, communication strategies and quadruple helix engagement shows low peaks that highlights problems in their design.

### **5.3 The fuzzy logic comparison**

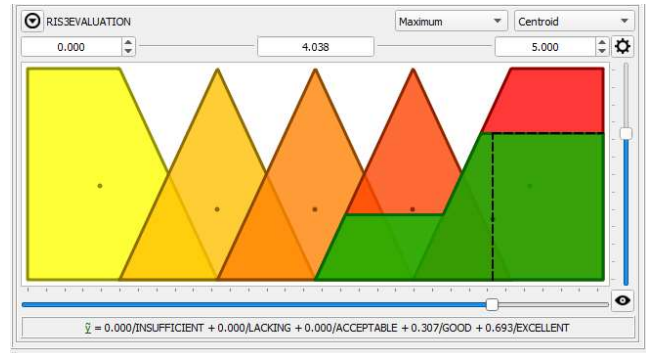
Now in the last part of the comparison, the output of the fuzzy logic will be compared. The fuzzy logic resumes what previously described and displayed, by providing a final qualitative judgment to the strategies and showing the possible outcome that they might bring to regions. Hence, the fuzzy logic makes a sort of foresight about the probability that regions might achieve the goals and objectives they have set. In the following figure, the fuzzy logic outcomes are provided.

**Figure 5.2 – The fuzzy logic’s outputs comparison**

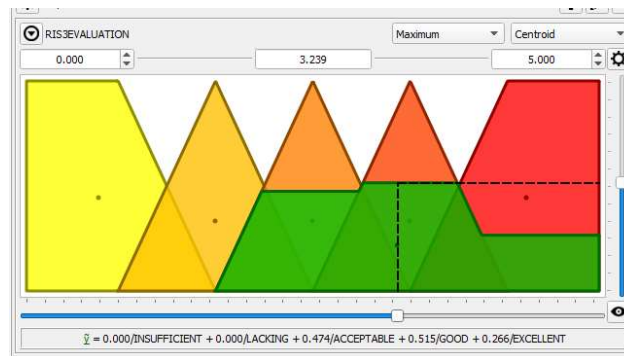
**The Basque Country**



**Extremadura**



**Emilia Romagna**



Source: figures elaborated by the author

Figure 5.2 shows the comparison of the fuzzy outputs on regions. The Basque Country’s strategy has an overall evaluation of “ACCEPTABLE” with a membership grade of 0.080, “GOOD” with a membership grade of 0.586 and an “EXCELLENT” with a membership grade of 0.414. The judgements of GOOD and EXCELLENT have similar membership grades, hence the possible outcome of the strategy has almost the same probability to be GOOD or EXCELLENT. Thus, the strategy is properly design and the green area shows with enough certainty, the positive impact that can have on the region, with a certain grade of probability to achieve the goals. In addition, the output’s shape confirm the homogeneity of the strategy, because the green area is uniform. The judgement of “ACCEPTABLE” is negligible, due to the fact that the membership grade is very little, therefore, there are not much possibility of occurrence.

Extremadura instead shows a different situation. First of all the fuzzy assigns to the strategy a qualitative judgement of “GOOD” with a membership grade of 0.307 and an “EXCELLENT” with

a membership grade of 0.693. Therefore, the strategy seems to be better designed with respect to The Basque Country's one, because the membership grade of EXCELLENT is higher and it is also far higher than the GOOD grade. Hence, there are more probabilities to lead to excellent outcomes than good ones. Moreover, the fuzzy logic overturns the results of the table 5.1 . Extremadura has lower arithmetic and weighted mean and higher standard deviation with respect to The Basque Country, hence the strategy has a lower final score, even considering the steps. Nevertheless, due to the inference rules, the fuzzy logic returns an output that is better in Extremadura than in The Basque Country, because the membership grades are higher in the excellent areas of the former. Thus, the possible outcome of Extremadura's strategy might be better than The Basque Country's outcome. The explanation may derives from the inference rules and steps composition, because for the 'centroid' method, in the Extremadura the fuzzy activates more "excellent" rules while in The Basque Country more "good" rules. This give another interesting perspective about the assessment method, where fuzzy logic can furnish a good contribution.

Emilia Romagna instead, shows a more dynamic situation, in fact fuzzy logic's output generates a green area that lays on three different values: "ACCEPTABLE" with a membership grade of 0.474, "GOOD" with a membership grade of 0.515 and an "EXCELLENT" with a membership grade of 0.266; the inference rules activated are 32 over 729. Thus, the possible outcome is really uncertain, because there are good probabilities that the strategy may lead to acceptable, good or excellent outcomes. This is a very interesting facet of the fuzzy logic, because it not only gives an overall final judgement to the strategy, but also it displays an image about the strategy's design. Hence, in case of E.R., policymakers and the head of Governance, should pay attention in the implementation phase, and also revise and reconsider the current design of the strategy, because there are possibilities that the strategy does not have the expected impact to the region, nor achieve the goals set, due to its "fuzzy" design.



## **Final comments and limitations**

This threefold assessment method furnishes a different point of sight about the monitoring activity on Smart Specialisation, hence it might be considered as an additional tool in order to underpin policy makers. Once strategies will be totally implemented, regions need to understand why and whether the goals are or are not fully accomplished. Thus, among several endogenous and exogenous factors that might affect RIS3s, answers might come from their design. What lays behind this though is that the more a region/nation knows itself, the more the design of the RIS3 should be meaningful, therefore higher may be the possibilities to achieve the goals that the region/nation has set. Therefore, this dissertation aimed at further testing this assessment method, in order to provide additional answers to its applicability.

The comparative assessment of strategies of The Basque Country, Extremadura and Emilia Romagna has emerged considerations about the S3 design. First of all, taking into account the statement of chapter five that “strategies realized by developed regions are better designed with respect to strategies designed by lagging regions, since the latter might not have the same capability and knowledge to design their strategies” is disconfirmed. In the fuzzy logic, Extremadura attested to be the strategy that has the most potential to lead to excellent outcomes and comparing it to those of The Basque Country and Emilia Romagna, is the strategy that has the higher probability to achieve the expected goals. Moreover, the weighted mean is just a little less than The Basque Country’s one, which is the highest. Thus, Extremadura has showed high capability to design a good strategy and it really knows itself and its potential. So, it is not true that lagging regions do not have the capability, knowledge and potential to develop themselves and their strategies. This facet might be taken into account when designing future development strategies.

Second of all, the statement that “regions belonging to different context but having structural similarities, may develop similar strategies in term of quality” is also disconfirmed. Looking at The Basque Country and Emilia Romagna strategies, they have great differences in terms of quality and design. The Basque Country’s strategy is far better than E.R.’s. one, not only in terms of marks’ average, which is 3.61 for the former and 3.22 for the latter, which reveal a gap in the two values, but also in term of overall final judgement. The Basque Country’s strategy has almost the same probability to lead to good or excellent outcomes, revealing good capability in the design, whereas Emilia Romagna’s strategy has more probability to lead to acceptable or good outcome than excellent. Thus, the strategy is more uncertain and there are not the same expectation to achieve the

goals. Moreover, some steps need to be revised because there are great differences in the marks of the priority areas. So, it is not true that regions that have structural similarities might develop similar strategies in term of quality's design.

However, this study entails some limitations: first of all the information that has been decided to analyze. Strategies are normally made by several documents, which regions take as reference in developing the steps that compose them. Sometimes during the design, not all the information that are relevant to a priority area are written in the RIS3, but it is probable to find them in the annexes or in external documents, which are elaborated by the region. If in the strategy it is expressively stated that further information is available in a linked document, this is considered as part of the RIS3 and, consequently, the reader should analyse it as well. Furthermore, other types of external documents that are linked in the RIS3 could appear. They could be relevant for the assessment or not and to understand if they are important, the reader should investigate what they talk about. If the document is strictly related to the RIS3 and its priority areas (such as the development of a plan for the public innovation, or the development of the priority areas) it could be considered; otherwise it could be rejected.

However, for a matter of time, fairness and practicability, it is has been decided to analyze just the RIS3s and a few of the documents which they are composed by. Therefore, the quantitative judgment of marks should be revised, by carrying out an extended and exhaustive analysis of all documents cited in the strategies. Hence, regions that have condensed the majority of information in the single RIS3, such as Extremadura, they have been advantaged, with respect to strategies that have developed several documents correlated to RIS3s, such as The Basque Country.

Secondly, the subjectivity of the reader. The Assessment Wheel 2.0 is made in a way that tries to reduce at the minimum the subjective influence of the evaluator. Three different columns, Priority area, Topics, Tools, help to look for and indentify the elements or aspects that are relevant for the priority area under assessment. Nevertheless, it is also true that the capability, sensitivity and knowledge of the evaluator entails some bias that it is hard to identify and consider.

Thirdly, the quality and the quantity of the information. What really matters in the assessment, is the quality and quantity of information available in the strategies. Even though the EU has provided guidelines in order to support regions in the design, they are not compulsory and neither explain which kind and how much information strategies have to contain. Therefore, we can come across to

strategies that have great differences in the quantity and quality of information. Conversely, the reader in making his assessment, is highly influenced by the information he finds; hence, this might greatly affect the marks and eventually the final outcome.

Fourthly, the sample. The assessment takes in consideration just three regional strategies belonging to three different regions. Therefore the sample is too small to affirm the consistency of the threefold method and to state what previously said, which disconfirms the fact that lagging regions have the same capability to design their strategies with respect to more developed ones, and regions that have structural similarities might not develop similar strategies in term of quality's design. The assessment should be extended to more strategies in order to further investigate how regions have designed them and if they follow or not the guidelines of the European Commission. It should be also interesting to consider strategies developed by regions that are very different among them, such as those in eastern or northern Europe, because Italians and Spanish regions have in some extent more similarities between them.

As far as my experience concerns, regions show great differences in designing their strategies. Some of them strictly follow the guidelines and have developed really good strategies, whereas other have barely taken into account what the EU suggests, by fulfilling the 'ex-ante conditionality' through 'normal' regional development strategies, which do not follow the steps of the Guide and the rationale of Smart Specialisation at all. Hence, at the end of the programming period it would be possible to discover great differences about the achievement or non-achievement of regional goals, and the impact that the strategies have brought to regions, with great work for policy makers for the next programming period. Therefore, I hope that this method might result helpful to furnish additional support in the monitoring and evaluation phase of S3.

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## **Annex – List of acronyms and abbreviations**

*EAFRD: European Agricultural Fund for Rural Development*  
*EDP: Entrepreneurial discovery process*  
*EMFF: European Maritime and Fisheries Fund 7*  
*EPO: European Patent Office*  
*ER: Emilia Romagna*  
*ERDF: European Regional and Development Fund*  
*ESF: European Social Fund*  
*ESI FUNDS/ESIF: European Structural and Investment Funds*  
*EU: European Union*  
*EU 28: Member States of the European Union*  
*EURADA: European Association of Development Agencies*  
*GDP: Gross Domestic Product*  
*ICT: Information and Communication Technology*  
*KETs: Key Enabling Technologies*  
*OECD: Organisation for Economic Co-operation and Development*  
*PCTI: Plan de Ciencia, Tecnología e Innovación*  
*R&D: Research and Development*  
*R&D+I: Research and Development + Innovation*  
*R&D&I: Research and Development and Innovation*  
*RIS3: Research and Innovation Strategies for Smart Specialisation*  
*RVCTI: Red Vasca de Ciencia, Tecnología e Innovación*  
*S3: Smart Specialisation Strategies*  
*S&T: Science and Technology*  
*SME: Small and Medium Enterprises*  
*SWOT: Strengths Weaknesses Opportunities and Threats*