Sustainable Baltic Sea Region

Towards Economic Transformation by Smart Specialisation Strategies

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TABLE OF CONTENT

EXECUTIVE SUMMARY

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This report examines Smart Specialisation strategy creation and implementation in the Baltic Sea Region. Through the Baltic Sea Region example the study advances the understanding of Smart Specialisation strategy, also known through the acronyms S3 and RIS3, as a place-based and evidence-driven innovation policy that aims at regional economic transformation. The study examines how the Smart Specialisation strategy development was conducted across the Baltic Sea regions and cities representing each Baltic Sea Region country and promoting economic development and innovation through Smart Specialisation principles.

This overview of Smart Specialisation in the Baltic Sea Region has been crafted by engaging partners of the Smart-Up BSR project in reflecting on how the strategy creation and revision work in their region prepares the path towards economic transformation. This complies with the goal of involving a large number of regional stakeholders in the Smart Specialisation strategy process and the efforts to improve Smart Specialisation implementation in the Baltic Sea Region. The advantage of the Smart Specialisation strategy lies in orchestrating innovation hubs around chosen themes with regional and cross-regional significance. This study presents what priorities and regional strategic actions can be observed and how these can be turned into cross-regional opportunities.

The study builds upon ten cases in nine countries of the Baltic Sea region. The focus of the Smart-Up BSR project has been on supporting regional development and innovations, including encouraging the Sustainable Development Goals Agenda 2030 into the development initiatives of regions. While the report focuses on the role of Smart Specialisation strategies in the Baltic Sea Region, the work of the participating partners has also included the promotion of instruments as a way to endorse and put into action the strategy content and chosen spearheads through innovation camps and pilots. The study pays careful attention to the recent revision of Smart Specialisation strategy in each region with the purpose of examining how Smart Specialisation strategies refocus and align local/national visions, and whether they generate incentives for inter-regional opportunities.

In short, the aim of this study is to outline the processes of Smart Specialisation strategy creation and how the prioritisation of regional spearheads was achieved in the Baltic Sea Region examples. The report investigates how the Baltic Sea regions have conducted multi-stakeholder work and decision making with regard to Smart Specialisation strategy and how they have shaped and re-shaped regional objectives and priorities. Guiding questions have been:

1. How have Smart Specialisation strategies been created and implemented in the Baltic Sea Region?
2. What are the themes and content of Smart Specialisation strategies in the represented Baltic Sea Regions?
3. How can we position the Baltic Sea Regions' innovation performance by Smart Specialisation strategy and implementation?
4. How do the regions include inter-regional engagement in their strategies objectives?
5. How do Smart Specialisation strategies and processes drive sustainable and cross-regional economic transformation?

The study bases its analysis on the strategy stories of ten regions representing each BSR country: Central Denmark Region with Aarhus, Berlin/Brandenburg regions, Estonia and Tallinn, Helsinki-Uusimaa region, Kotka/Kymenlaakso region, Latvia, Lithuania, Gdansk-Pomorskie-Sopot region, Stockholm and St. Petersburg region.

The analysis is conducted from four perspectives and analysis by:

- Regional Innovation Scoreboard indicators,
- Smart Specialisation strategy stories,
- Smart Specialisation strategy responsibility and
- Regional Strategy Diamond balance.

The cross-case analysis presents findings to shed light on how the Smart Specialisation strategies have been created, revised and implemented in the Baltic Sea Region.

The findings of the first cross-case analysis focus on the regional scoreboard innovation indicators. As the Regional Innovation Index (RII) describe the innovation capacity of a region, six criteria - lifelong learning, innovative SMEs collaborating, public and private R&D expenditures, SMEs innovating in-house, Non-R&D expenditures - were selected to be applied to all regions in this study as having significance for the Smart Specialisation strategy. This study offers the deeper understanding of importance of learning, learning regions, innovation funding and entrepreneurial spirit. Based on this analysis of Regional Innovation Scoreboard indicators, Helsinki-Uusimaa, Stockholm, Berlin-Brandenburg, Central Denmark seems to perform best.

In the second analysis the strategy stories showcase how regions and countries in the Baltic Sea Region advance towards Smart Specialisation strategy creation and implementation. In many cases the territories or regions are driven by a major city or port, who bridge the territories together via digital, logistics or harbour management solutions. Regions driving forces may be either 1) Innovation, science and technology or 2) logistics and local industry based. Some regions rely on industry collaboration and clusters/ecosystems. Some of the regions prioritize and focus, some of them diversify.

The third perspective examines the responsibility for strategy creation and the implementation in the region or national level. In each of these cases the processes, roles and ambitions reveal to be different even though the purpose is to drive economic development. In general, the responsibility resides in national level in Baltics like in Estonia, Lithuania and Latvia. In other Baltic Sea countries, like in the Finnish, Swedish, Polish and German regions the responsibility is regional. Lithuania represents a hybrid model through a governmental agency. As a conclusion, the Smart Specialisation strategy creation, revision, and implementation with a multi-stakeholder collaboration nurtures dynamic regional actions and success in driving the economic transformation, when the responsibility is regional. One positive example to mention is that several Finnish regions have organised themselves and created self-orchestrated collaboration that binds regions together in Smart Specialisation strategy work and implementation even without national impulse.

The fourth analysis is based on the balance of the five angles of the Regional Strategy Diamond: strategy, actions, competitiveness, competence and culture & leadership. This is an active continuous tool for regions to secure positive results from the implementation of the Smart Specialisation strategy and avoid imbalances. Regions may well have formulated strategies but may be missing the competences to put them into action or vice versa. Regions cannot be successful without competitive and competent strategies and actions. All the Baltic Sea regions are analysed in the study to help the regions to find out their bottlenecks and achieve the balance between Regional Strategy Diamond angles.

Smart Specialisation work has shown that innovation and development policies in the Baltic Sea Region have led to high performance and brought prosperity on varying grounds, either through science, knowledge and economy, or digitalisation, logistics and harbour developments. Smart Specialisation has contributed in a positive way to the focus and prioritisation of innovation strategies and policies and impacted to the innovation performance of the regions. However, the study concludes that neither inter-regional collaboration, Sustainable Development Goal implementation, nor economic transformation- - are yet a norm in the Baltic Sea Region.

PREFACE

Smart Specialisation helps regions use their strengths to boost growth and prosperity. Yet, many regions lack methods or institutional frameworks to implement it successfully. We are interested to look into how regions work to align their ecosystems with Smart Specialisation initiatives to ensure the growth of their businesses and the wellbeing of their citizens. To understand how Smart Specialisation is implemented is not only relevant for individual regions, but also for macro-regions to better steer investments across the Baltic Sea region.

In this study weattempt to look behind the scenes at how regions embed Smart Specialisation strategy creation and implementation in their regional, economic, and spatial development policies. By working with nine regions in each of the Baltic Sea Region countries we get an insight into how Smart Specialisation strategy creation has been done on the ground through the help of specific organizations responsible for Smart Specialisation in those nine Baltic Sea regions.

Every region has its particular strengths. When implementing strategic projects, monitoring and reflection on the key outcomes are crucial to secure that revisions are evidence based and lead to improvements. We describe how each of the participating regions have made choices by discussing and determining a list of priorities. Our study looks into stakeholder engagement, and how monitoring processes have taking place during strategy revision, how industry, representatives of the research community and civil society have, together, selected proposals to be turned into projects. We also wanted to know how the responsible regional organisations can secure implementation of Smart Specialisation strategic projects and maintain a steady result orientation.

While we focus our attention into positioning the regions with reference to the Regional Innovation Index of the European Regional Innovation Scoreboard, this is only to put the regions' broader Smart Specialisation process into perspective. The reader should be made aware of the wider range of strategic actions that are involved in building the competitiveness which measured by the Innovation Index.

Our study is about the importance of strategy creation and related implementing actions in which the Smart Specialisation approach and methodology plays a mobilising role. To make this more tangible we introduce the Regional Strategy Diamond and analyse the different steps of the strategy creation and revision process through the angles of the strategy diamond. Throughout the analysis we attempt to focus on the balance between the angles of the Regional Strategy Diamond. This balance, we suggest, can minimize risks such as lack of evidence-based knowledge when 'higher-up' entities assign sectors with the promise of growth, or when emergent industries are bypassed through consensus with strong clusters, or when regions hold on to a diversified 'wish list' leading to a 'me-too' strategy. By taking all the strategic angles into consideration regions can weigh out between selecting industries that are growing and significant for the region and the country, and still keeping paths open for promising emergent opportunities.

With this study we encourage regions to strive for a balance between competitive elements, organisational roles, and intentional strategic prioritisation in Smart Specialisation which will enhance cross-regional successful developments in the Baltic Sea Region.

Finally, we would like to thank the many colleagues in the nine countries with whom we have collaborated. We have greatly benefited from their insights, commitment and the work they have done through their organisation in their regions. We would like to specifically acknowledge the support of the Uusimaa Regional Council, the European Committee of Regions, the Department of Organisation and Management of Aalto University, and the funds provided to each region through the EU Interreg Programme.

Taina Tukiainen ja Patrizia Hongisto
Helsinki, August 2020

FOREWORD

Markku Markkula

Vice-President, European Committee of the Regions
Chair of Espoo City Board
President, Helsinki-Uusimaa Regional Council

Globalisation, digitalisation, climate change and demographic change are vivid examples of the challenges and factors shaping our future. What roles do the EU and the regions have in facing these challenges? And how to seize the opportunities for new business developments, especially start-ups, to utilise digitalisation – in the sharing economy, the circular economy and the silver economy?

I stress the real-life practice: we, in other words the regions of Europe, together with cities and other municipalities are the backbone of the European Union – now and even more in the future. Why? In the multi-governance EU, we are closest to European citizen's. We have a crucial position –for encouraging collaboration, unity, and understanding European values and societal practices. We can boost competitiveness for transformation by providing important innovation platforms and co-creating ecosystems for companies, start-ups, universities and citizens. Smart Specialisation is an excellent instrument for fostering competitiveness at regional, local – and through them – European and global levels.

As the former President of the European Committee of the Regions, I want to stress that all regions are willing to contribute actively to the European dialogue on the future of Europe. As an example, our Helsinki Region wants to be an active, smart and forward-looking partner in building our common European future. We are implementing our Quadruple-Helix Smart Specialisation Strategy with high ambition and commitment – and we are open to international collaboration with our partners, both existing ones and potential new ones.

I want to congratulate those who made this Smart-Up project a reality – and highlight the importance of supporting regional development, innovations and the UN Sustainable Development Goals Agenda 2030. The study gives clear evidence: Smart Specialisation work has shown that innovation and development policies in the Baltic Sea Region have led to high performance and have brought prosperity on various grounds, through science, knowledge and economy, or digitalisation, logistics and harbour developments.

I want to highlight the importance of the Smart-Up BSR innovation camps, which brought politicians together with many enthusiastic people from regions, cities, the academic world, expert and civil society organizations, traditional businesses and start-ups. The camps were based on regional and local challenges identified through a bottom-up process. The camps were an instrument to reiteratively discuss these pressing regional and local challenges. The frequent meetings at innovation camps have allowed us to build trustful relationships and open new opportunities for inter-regional collaboration. This project – and the Covid-19 pandemic – have convinced me, and many others, of the importance of the mental dimensions – and the personal dimensions – of creating attractive environments (what the Japanese call physical, mental and virtual Ba) for building regional innovation ecosystems and enhancing collaborative networking.

Smart-Up BSR has been an excellent systematic arena for regional representatives within the BSR to engage in discussing the European Commission's proposals regarding the future of Europe. Such inter-regional discussions provide an opportunity for regional representatives to share ideas and jointly react on each other's contributions, for strengthening their messages and making their voices heard on a European Union level.

FOREWORD

Alessandro Rainoldi

Head of Unit, B3 Territorial Development
Joint Research Centre - European Commission

Smart Specialisation is a place-based, experimental policy which encourages to invest in learning how to best identify, design, and implement policies that can effectively work in a specific context, as opposed to following universal recipes. The basic idea of smart specialisation is to define only a limited set of priority areas, which should correspond to the social and economic challenges in the region, and to channel public investment to these identified priority areas in order to make the most of existing growth opportunities. Although smart specialisation was "Made in EU", it has been attracting attention worldwide, and today many "pockets" of smart specialisation are being experimented on in different parts of the world. Moreover, smart specialisation has been acknowledged as a promising enabling methodology for the achievement of the Sustainable Development Goals under the United Nations' 2030 Agenda.

The EU Strategy for the Baltic Sea Region (EUSBSR) builds upon long traditions of collaboration, where the smart specialisation approach allows regions to achieve competitive advantages at the macro-regional level, making the best use of their assets, competencies and funds. Trans-national collaboration accelerates regional growth, provides visibility and access to global value chains. Out of all EU macro-regionals, the EUSBSR is the most experienced smart specialisation implementor, and for that reason it has to be an explorer of new ways, new paths and new solutions. However, advancing further and making the right decisions requires knowledge, analysis and active exploration.

The Smart Up BSR project has invited the European Commission's Joint Research Center to join its innovation camps and has integrated the JRC Peer Exchange & Learning Workshop methodology. As acknowledged in the Aarhus Camp, a common challenge to all regions is finding ways to involve relevant stakeholders, get their voices heard and help them gain a sense of ownership regarding the policy. Regions need more space and opportunities for continuous entrepreneurial discovery in the RIS3 context, more efficient stakeholder platforms for on-going discussions on the progress of smart specialisation and better ways to identify new opportunities.

In this context, the series of innovation camps held within the Smart Up BSR project created a forum for smart specialisation implementation, a platform for bringing together regional authorities, policy makers, academia, experts and entrepreneurs to learn from each other, and a place to work out and pilot more innovative and courageous solutions to their local challenges. This unique possibility to engage in in-depth reflections and to study the regions regarding RIS3 has now concluded and the three year journey is now crystallising in the launch of the book of 'Baltic Sea Region towards Economic Transformation by Smart Specialisation'.

We would like to congratulate this important publication, which concludes with many insights aimed at contributing to boost inclusive regional stakeholder engagement and better science-industry-society dialogue, and encourage all actors in the Baltic Sea Region to keep the momentum in order to tackle present and upcoming challenges with a renewed spirit of engagement in achieving transformation and sustainability through smart specialisation.

1 INTRODUCTION

1 INTRODUCTION

In today's globalized economy, it is increasingly vital for cities and regions to identify and develop their strengths and competitive advantages. Economic prosperity and the availability of jobs strongly depend on a region's ability to invest in the right types of innovative actions that fit their specific profile. One of the policies which the European Commission has developed to help regions and national governments achieve this, is Smart Specialisation. Smart Specialisation has become a cornerstone of the European cohesion policy, attracting a sizeable part of the EU budget. If these funds are spent effectively, Smart Specialisation can generate a wide array of opportunities for EU companies and citizens.

Summarised, Smart Specialisation strategy is realized by developing partnerships and bottom-up approaches in which local authorities, academia, businesses and civil society cooperate. Together, these partners aim at identifying strategic areas for innovative action based on strengths and the potential of the economic sectors present in the region. This process of creating partnerships and working together is complex, not only does it involve a wide set of actors and interests, but it also requires a balance between place-based consistency and innovation.

Smart Specialisation strategy as a concept has been implemented in an increasing number of regions throughout the European Union starting from 2014. The strategy is unique as an economic development measure in that it invests in the development of research, experimental development and innovation in a targeted way, focusing on priorities which reflect and develop the strengths of the region. Smart Specialisation strategy has started making a positive change in Europe. As Peter Berkowitz, currently in charge of the Unit for Smart and Sustainable Growth in the EC Directorate-General for Regional and Urban Policy (DG REGIO), stated already early 2019, Smart Specialisation has allowed "… a strategic approach to innovation development, prioritizing research

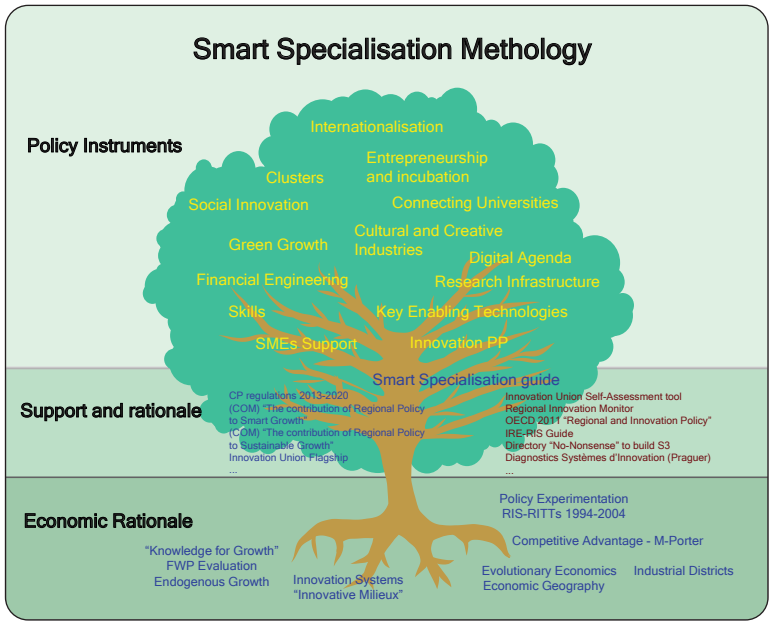


Figure 1 Synthetic Overview of the Interactions Across Smart Specialisation-Related Policy Action

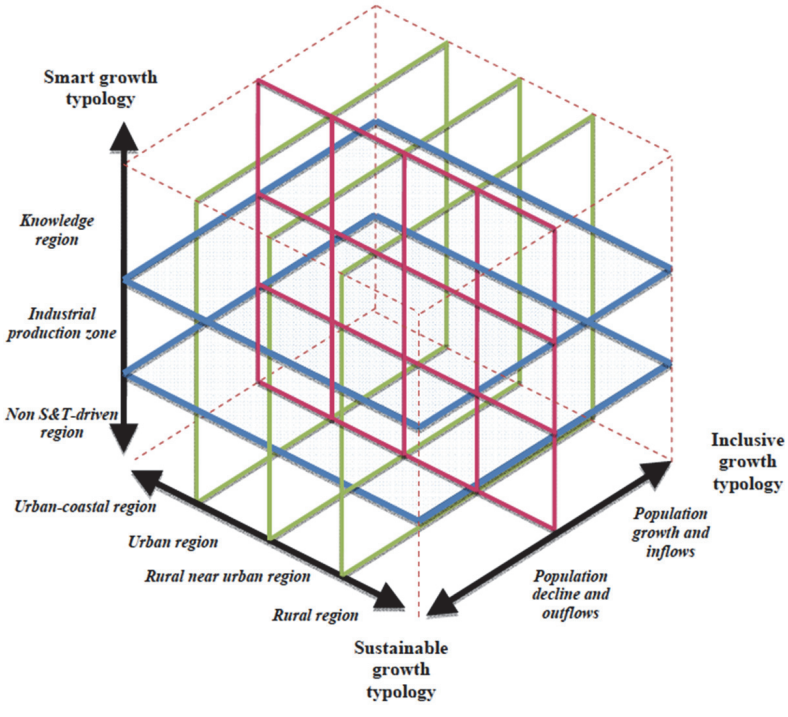


Figure 2 Europe 2020 Dimensions – Integrated Regional Typologies

and innovation, and concentrating resources on the most relevant areas for each region."[1] As Smart Specialisation is an opportunity to bring together main stakeholders interested in in innovations and to involve them in the process of selecting priority areas, Smart Specialisation strategy process activates greater cooperation between the private and public sectors.

As Smart Specialisation is also linked with the innovation capacity of a region, it may be tempting to associate the strategic priorities with technological development. In cluster theories technological development is often understood as a branching phenomenon, whereby new technological trajectories are expected to branch out from previously existing or related knowledge and entities producing or exploiting that knowledge. However, though technological knowledge frameworks have an important bearing on the regional potential, Smart Specialisation covers a much wider knowledge and innovation space. This interconnection between industry and society present in the Smart Specialisation strategic prioritizing is envisioned to underpin several areas of knowledge-based regional economic development throughout the regions of Europe for the coming decade. From the onset, in the Smart Specialisation guide published in 2012, the rationale of Smart Specialisation was explained both from an organic understanding of growth as illustrated in Figure 1, and a structural compartmental view of regional typologies impacting regional performance illustrated as a three-dimensional box diagram in Figure 2[2].

The European Commission's programming period is now shifting, and the future of the European region has to build and improve on the learnings from the strategy work that emerged from the

1 https://www.interregeurope.eu/ecoris3/news/news-article/4783/smart-Specialisation-is-accelerating-in-lithuania/

2 https://link.springer.com/chapter/10.1007/978-3-642-33395-8_6#citeas

conceptual models presented as regional drivers through Smart Specialisation. Based on the analyses of regional features and innovation potential, broad scenarios have been developed to guide strategic prioritization. Smart Specialisation strategies have already trickled down to implementation roadmaps, and interim assessments have taken place. It is important at this stage to make a realistic analysis of the past and present experiences and the regions' abilities to leverage on Smart Specialisation strategies. The basic premises on which Smart Specialisation has been operationalised still hold:

- More efficient and effective regional development policies,
- Importance of avoiding overlaps and imitation
- Setting innovation as a priority (Europe 2020) and improving innovation (strategy) processes
- Better use of public resources by aiming for PPPs and synergies between funds (EU, national, regional and private)
- Driving economic transformation with a focus on regional profiles for global value
- Leveraging academic insights and concepts of growth, competitiveness and clusters.

In addition, it should be noted that Smart Specialisation strategy plays a role in the achievement of Sustainable Development Goals (SDGs). Every region is facing the challenge of how to best ensure a thriving population and good economic performance in a sustainable manner.

1.1 Motivation and Objectives

Smart Specialisation strategy, known as S3 and also referred to as RIS3 (Research and Innovation Strategies for Smart Specialisation), addresses structural changes in the economy of a country or region. This involves defining strategic priorities for economic transformation towards permanently sustainable competitive advantages. Regions have designed roadmaps for Smart Specialisation to support areas that inevitably account for a larger share of GDP, such as high added-value, knowledge focused, and highly skilled economic activities. Regions have worked on the strategic priority selection as well as the revision of these strategies based on inclusive processes. These processes are of strategic importance for designing policy instruments that not only maximize the country's knowledge-based development potential but also ensure an active implementation and mobilisation of SDGs objectives.

Policies which support tangible implementation of the strategies are increasingly needed to safeguard the path to economic growth and economic transformation. As mapped out in the Joint Research Centre report on Smart Specialisation implementation (2019), over the European structural funds programming period of 2021 to 2027 Smart Specialisation is expected to continue to play a major role in cohesion policy and regional development. Most importantly the long-term goal of this programming is economic transformation. In addition, the need is growing for the regions to actively utilize these activities to tackle the achieving Sustainable Development Goals (SDGs). With the increasing challenge of implementing SDGs the focus of S3 implementation can serve to accelerate action.

In order to be able to efficiently implement and subsequently update Smart Specialisation strategies for the next multiannual financial period, this study presents a view on the Smart Specialisation strategy process and what action it triggers at the interface of different administrative and stakeholder levels. This report portrays specific territories in the Nordic and Baltic region as examples of distinctive administrative approaches and it aims to present the variety of these specific regions in the European context. The Baltic Sea Region serves as a showcase for balancing the regional/national landscape towards economic transformation and seeking to position regional characteristics with relevance to the global value chains.

Smart Specialisation has been adopted by 38 of 74 regions in the Nordic Region (European Commission, 2019). The Nordregio Policy Brief (2019) observed that "the acceptance and implementation strategies differ markedly across the countries and regions". This study contributes to the work of examining regional characteristics in the Baltic Sea Region with the intent of uncovering what characterizes the strategy work in the BSR regions as a starting point for potentially collaborating on trans-regional or macro-regional opportunities to support economic transformation.

The participating regions as partners of the Smart Up Baltic Sea Region project have deliberately outlined their current regional Smart Specialisation strategy process. The strategy work analysis was done alongside with implementing strategically selected pilots. The time period covered by the project is 2017-2020, and the resulting multilevel setting for strategy creation with focus on Smart Specialisation is presented in this document. Strategy work is analysed as first having relevance locally, while it subsequently functions as the basis for the upcoming European Smart Specialisation priorities, implementation, and update shaping the period after 2020.

This overview provides the opportunity for a reality check on how stakeholders have participated in furthering the strategy development and implementation. Local stakeholders involved have experienced and sustained the integration of their local development strategies with the RIS3 and their strategic framework of priorities. This process strengthens regional capacity for successfully driving economic transformation through intentionally adjusting regional/national development.

Smart Specialisation strategies have a central role not only within this period of achieving smart regional/national development, but the strategies

are going to become an enabling condition in the next programming period 2021-2027. While this document focuses on the key role of the Smart Specialisation strategy process in regional/national initiatives in coordinating the strategic objectives, it paves the way for important revisions at different levels. One of the ambitions is to align the regional/national development driven by Smart Specialisation strategy with inter-regional actions and possibly with the UN SDG initiatives. This will imply a continuous revision of the priorities throughout the process. Also, through cross-border interregional initiatives for cooperation in research and innovation programmes – specifically based on Smart Specialisation – the region will play a key showcasing role in macro-regional action in the coming years.[3]

The Smart-Up BSR project has particularly emphasized the tracking of the Smart Specialisation strategy process in the participating regions in order to follow-up on specific actions that drive the strategic revision forward. If it is assumed that strategic revision is an active part of implementation and that it facilitates policy instruments designed to achieve long term goals, then strategy revision processes deserve increased attention. Additionally, effective monitoring mechanisms play a role in mirroring the actions taken towards the identified priorities by the Smart Specialisation strategy processes, as well monitoring can serve regions to guide their actions towards a long-term transformative potential.

1.2 Method of the Study

In comparison to the rest of Europe, the Nordic countries may seem rather homogenous at a first glance. However, have we been able to demonstrate a similarity in approaches within the BSR macro-region with respect to the strategic processes of creating or integrating Smart Specialisation? Is enough information available on the local situations to make useful comparisons? Unavoidably, there is a need to investigate and perhaps discover that the strategy creation and revision processes vary greatly from region to another. We can assume that differences may to a large extent be due to national differences in the institutional set up. Also, mediating role in innovation deserves attention. The actual processes of how the organisations responsible to make Smart Specialisation strategies operational carry a message in addition to the actual Smart Specialisation strategy documents.

The Smart Up BSR project has addressed the strategy creation and revision process from 2017 to 2020 in the Baltic Sea Region. This has allowed a view into the specific characteristics of several regions, cities, or innovation ecosystem in the Baltic Sea Region. Regional examples have showcased strategic interaction towards economic transformation through regional strategies around Smart Specialisation. The examples show that working with focused policies and investments as a result of Smart Specialisation processes can look different in different territories. For example, each region may have a very diverse set of partners behind economic initiatives, and some of the partners may be directly connected to Smart Specialisation functions, while others may be difficult to recruit into Smart Specialisation. Thus, the overall challenge is in understanding the strategy creation and implementation in the Baltic Sea Region territory. In this study the guiding questions therefore are:

3 Study on Macroregional Strategies and Their Links With Cohesion Policy. Data and analytical report for the EUSBSR (2017). European Commission Directorate-General Regional and Urban Policy. https://ec.europa.eu/regional_policy/sources/cooperate/baltic/pdf/eusbr_links_cohesion_policy.pdf

1. How have Smart Specialisation strategies been created and implemented in the Baltic Sea Region?
2. What are the themes and content of Smart Specialisation strategies in the represented Baltic Sea Regions?
3. How can we position the Baltic Sea Regions' innovation performance by Smart Specialisation strategy and implementation?
4. How do the regions include inter-regional engagement in their strategy objectives?
5. How do Smart Specialisation strategies and processes drive sustainable and cross-regional economic transformation?

While this analysis helps regional differences come to the surface, the aim is to point out opportunities rising not only from commonalities as is usually assumed, but also from divergencies, and therefore set in motion cross-regional capacity building.

In addition, as regions are tackling SDG strategies, the study proposes taking a closer look at the prospects of linking the way Smart Specialisation strategy induces economic transformation with opportunities to push forward actions supporting the UN Sustainable Development Goals.

In order to understand the dynamics of the Smart Specialisation strategy process this study uses a strategy framework drawn from scholarly work in the field of management science and which is informed by studies on strategy as practice. Based on the strategy diamond (Burgelman, 2008), this study introduces a model adapting the strategy diamond to serve as illustration for the process of regional strategy creation and revision: the Regional Strategy Diamond for Economic Transformation. The model as illustrated in Figure 3 is used in this study to guide the analysis of the ten strategy stories reflecting on the regional process of strategy creation and revision.

The strategy diamond has five angles in total: Strategy, Actions, Competences, Competitiveness, and Leadership in Context. The model assumes that each angle drives the process in an equally significant way. The core of the diamond represented by Leadership in Context plays a key role in enabling the other angles to link to each other while facing movement and change within the internal and external environment. However, each of the angles can functions towards maintaining or disrupting balance. Thus, though strategy is often emphasized as the most crucial activity, strategy creation as content creation and strategy as communication only represent one angle. As such, the strategy creation process (what we say) contributes by formulating the direction and the priorities the region moves towards, but every other angle is equally engaged in maintaining a successful balance through tensions and movements.

It is important to understand that in this visualization strategy creation is but one of the dimensions and is only partly responsible for the success needed to reach economic transformation. Indeed, the strategy is crucial in pinning down in a clarified statement what is strategically agreed upon. However, the strategy in action (what we do) demonstrates that what is said is also acted upon. Actions confirm the strategy and make it relevant in the context. Equally important for the strategy as practice are the two other dimensions: Competitiveness (how the region competes) and Competences (what the region has in terms of assets and resources). These five angles work together and towards each other.

The strategy processes are located at the interface between the internal context in the region and the external environment, which can be either national, cross-regional, or have a global reach. The leadership and institutional or administrative context can operationalise the five angles and their relationships, and in doing so it can enable the region to draw from its own internal environment, and from actions within the cross-regional and macro-regional environment.

A strategy revision can be initiated from any of the angles and can be orchestrated by different administrative agencies. In order to achieve economic transformation, the movement from and towards the angles, inwards and outwards, needs to be kept vigorous, constantly balancing between the dimensions. It is crucial that the

strategy creation process be kept as dynamic as the regional environment requires, responding to the interchange between the regions that impact it, yet the strength of a region lies in the ability to maintain the balance between the angles.

The analytical approach is applied to the strategy stories of the Baltic Sea Region partners in the Smart Up BSR project representing actors and regions performing Smart Specialisation strategy in the Baltic Sea Region countries. Methodologically the partners have identified different stages of the strategy process within their operation framework and, to some extent, from the point of view of their own organisation. The emphasis on the process description of a specific implementing organisation includes the reality of how collaboration is steered in practice. In many cases collaborative strategic action is not necessarily led through strategy, but largely by balancing common and divergent elements between organisations. By collecting local evidence with the explicit procedural features as described in the model, the process of strategic creation and revision attempts to respond to the commonalities and divergencies that are made visible. The aim of the analysis is to provide a lens to make the Smart Specialisation strategy process sufficiently easy to recognize, point to, and align with.

In order to actualize the connection from idea manifestations to implementations, each partner of the Smart Up project community provided a roadmap. The Smart Specialisation strategy roadmaps/implementation plans are based on existing strategy, national or regional, with some reference to revisions that are still in process or are being approved at the time of writing. Thus, depending on the regional timeline this Smart-Up BSR compilation of outputs by each partner provides an overview of the existing results of the Smart Specialisation strategy integration, either through an implementation process, or by a plan to be implemented.

It should be kept in mind, however, that implementation plans are only relevant with regard to what an organisation is realistically mandated to do as a strategy partner and in its role within the innovation ecosystem. In the cases where the partner organisation was not responsible for Smart Specialisation strategy implementation, then a roadmap was attempted based on how the Smart-Up BSR partner could position the roles and responsibilities of the strategy creation, implementation, and revision process in their region.

Figure 3 Regional Strategy Diamond for Economic Transformation

1.3 Structure of the Book

Following this introduction, Chapter 2 maps out the current state of Smart Specialisation strategy as a concept and in its function as regional policy in EU countries and regions. The chapter surveys literature, revisions and expansions of Smart Specialisation strategy which are already in process to achieve sustainable action in economic transformation.

Chapter 3 compiles 'strategy stories' and describes how Smart Specialisation strategy has been addressed by regional/national authorities in the Baltic Sea Region. The Smart Specialisation strategy stories in the Baltic Sea Region territories represented by the Smart Up BSR project are used to showcase processes of how the strategy creation, revision, and policy making were combined towards enhancing economic transformation.

Chapter 4 presents a cross-case analysis based on the positioning of the studied regions through the Innovation Index indicators and based on the strategy stories, while Chapter 5 discusses the findings and results. Chapter 6 presents the conclusions.

2 TENSIONS IN SMART SPECIALISATION STRATEGY CREATION

2 TENSIONS IN SMART SPECIALISATION STRATEGY CREATION

The EU has called countries and regions to develop Smart Specialisation strategies for research and innovation to ground their research and innovation investments from European Structural and Investment Funds. This chapter systematically reviews the current understanding of Smart Specialisation strategy creation. It presents a literature analysis of academic studies on Smart Specialisation strategy creation and a review of the Joint Research Centre information repository.

The main objective of the Smart Specialisation strategy, implemented in the European Union, is to enhance Europe's regional competitiveness in the world. In order to achieve this, the European Commission has mandated countries that wish to use the financial investments from the EU Structural Funds to set their own priorities for RDI. With the implementation of the Smart Specialisation strategy, it is aimed to exploit the innovative potential of the European regions, strengthening the links between education, research, experimental development and innovative activities with the economic needs.

2.1 Smart Specialisation - EU Policy Framework

Investing in research, innovation and entrepreneurship has been at the heart of Europe 2020 accompanying the goal to maximize Europe's potential to deliver smart, sustainable and inclusive growth. In its core, designing national/regional research and innovation strategies for Smart Specialisation has been a means to deliver more targeted Structural Fund support and harness regions with policies to support their economic transformation. To enhance the potential for a growing sustainable knowledge economy, regions have joined forces to pool resources on the basis of matching Smart Specialisation priorities in high value-added sectors and partnerships in specific fields have been developed. In addition, thematic Smart Specialisation platforms have also been created. According to the figures of the Smart Specialisation platform over 120 Smart Specialisation strategies have been developed, over EUR 67 billion have been made available to support these strategies under the European Structural and Investment Funds as well as through national / regional funding. The expected achievements by 2020 have been to bring 15 000 new products to market, to create 140 000 new start-ups and create 350 000 new jobs. Moreover, to support the process, the Commission has set up a Smart Specialisation Platform, which, since 2011, has advised Member States and regional authorities on how to design and implement their Smart Specialisation strategies. It facilitates mutual learning, data gathering, analysis, and networking opportunities for around 170 EU regions and 18 EU national governments (COM(2017) 376 final). By mid-2018, 18 EU Member States and 175 EU regions, as well as 5 non-EU countries and 15 non-EU regions have registered to the S3 Platform, and the community is continuously growing.

The Smart Specialisation platform has provided guidelines and tools for monitoring and assessing. The regional Smart Specialisation strategies have been encouraged to outline their policy mix (EU funded and other) as used in implementation in order to realize political visions and strategic objectives. To turn the outlined measures into action for example regional strategies have to particularly be fit to stimulate private research and innovation investment. This includes constantly balancing the involvement of stakeholders, from public authorities, to scientific entities, to entrepreneurs, in the design of individual support tools and in the concept of the overall innovation

support system. Such work should encompass not only direct financial support to specific R&I projects, but also cooperation platforms, support services, infrastructures.

As an innovation policy approach, Smart Specialisation strategy aims at the renewal of regional economies through specialisation and diversification. It suggests a strategy and a global role for every national and regional economy, including both leader and less advanced territories. (Foray, D. et al., 2012).

European regions have been guided to analyse their regional strengths and to create their own regional R&D strategy for Smart Specialisation. This requires in addition to a local entrepreneurial knowledge also recognizing domains for future growth and participation in the global markets. Reaching to an understanding of business opportunities on the global markets entails creating strategies that combine the existing regional knowledge and industrial strength and encourage innovative solutions in R&D or market-based technology products. Smart Specialisation strategy has spread fast in policy circles (Foray, 2015; Foray, David, & Hall, 2011), although as concept it is still evolving. This is related, first, to the fact that the S3 concept has moved from its origins in research and innovation policy into regional policy, and from an aspatial and narrower sectoral perspective on innovation into a more multidimensional approach (McCann & Ortega-Argilés, 2013a, 2013b). Second, the concept is responding to the unprecedented policy experimentation taking place across Europe, as an increasing number of regions adopt the S3 approach and design S3 strategies. S3 has been an ex ante conditionality to access European Structural and Investment Funds in the European Union (EU) programming period 2014–20. For the knowledge base related to S3 implementation to grow, more in-depth studies of their contextualization in different regional development settings are needed.

We can base it on a dynamic theory of growth, which allows smart Specialisation strategies to coordinate the search of new business areas through an entrepreneurial discovery process. (Foray at al., 2012:2; Foray, 2015; Mäenpää and Teräs, 2018) Included in the process are regional stakeholders in a triple helix fashion. In this context stakeholders may include organisations, which may to formally carry the responsibility for the Smart Specialisation strategy work (consultant agencies and other non-public actors).

The development of Smart Specialisation strategy may have been seen as a set of certain type of rules and procedures to fulfil the ex-ante conditionality, which has been enforced by the European Commission (EC) to access the ESIF. The development of Smart Specialisation strategy can be seen as a game of developing a strategy without a real obligation to implement it.

Sörvik et al. (2019) emphasized that to increase the knowledge base of S3 implementation, more in-depth studies of their contextualization in different regional settings are needed.

Contextualisation should be considered as an important part of Smart Specialisation, given that it seeks to ensure that proposed actions are based upon sound evidence that properly reflects the comparative advantages of the physical and human assets of particular places in the global economy. (Soumodip Sarkar et at., 2020:4)

The European Commission has examined Smart Specialisation and come to the conclusion that it has evolved from a theoretical concept to a tool for the implementation of national and regional innovation policy in all European Union regions. It is relevant to note that Smart Specialisation strategies have significance irrespective of the regions' economic development level, innovation performance, governance structure, research capabilities or business environment.

Smart Specialisation Strategy in Innovation and Public Organizations Actors

The role of public organisations in the Smart Specialisation strategy process for regional economic transformation is prominent, thus expanding the range of collaboration in innovation. Although the role of public organisations may vary (Mäenpää, 2020:6) Smart Specialisation goes beyond the passive support of public organisations as funding is allocated. Whereas universities and companies have relied on innovation to fulfil their own as well as their societal function it is through

the Smart Specialisation strategy process that public organisations have gained a key role in innovation activities and in being protagonists of Specialisation choices in regional and inter-regional forums. Thus, Smart Specialisation strategy has allowed a collaborative process in triple helix fashion to formulate strategy and identify key policy objectives. Smart Specialisation strategy can through this collaboration among regional actors ensure a tailored strategy design and policy making process, followed by a monitored implementation process to be reflected upon. As Rodríguez-Pose, di Cataldo & Rainoldi (2019:9) point out regional public authorities function as equally significant pillar as companies and universities in the innovation mechanisms of a region. Therefore, the capacity of a region to deliver does not only depend on each separate pillar but on their capability to collaborate in order to deliver. There is agreement that in Smart Specialisation strategy "local and regional authorities have become key players in the promotion of the interactive collaboration between all relevant regional stakeholders for the collective identification of key innovation assets and long-terms strategic priorities." (ibid, 2019:9)

Morgan (2013) identifies three challenges for EU regions with regard to Smart Specialisation: conceptual, operational and political challenges. In order to overcome these challenges, it is important to view that the role of governments in Smart Specialisation process grows as regional governments recognize that innovation is a collective effort in which the capacity to work together and lead the strategy coordination process is a decisive factor. Accordingly, the Regional Strategy Diamond (Figure 3) presented as a framework in this study puts leadership and context in central position to balance the other key angles of the regional strategic creation process as practice.

Smart Specialisation Strategy and Regional Innovation

Smart Specialisation can be seen as a continuation of regional innovation systems (RIS) thinking (McCann & Ortega-Argilés 2016). A historical view regarding the background theories of regional innovation systems has been conducted by Asheim, Smith and Oughton (2011: 877). They distinguish regional innovation systems from other innovation theories, such as e.g. national innovation systems (NIS) (Freeman 1984), or theories of industrial clusters (Porter 1998a, 1998b; Baptista & Swann 1998; Swann & Prevezer 1996) which have affected the evolvement of regional innovation systems. Broader innovation theories, e.g. learning regions (Asheim 2012), or innovative milieu (Crevoisier 2004; Camagni 1995), and triple and quadruple helix have broadened innovation theories focused on research and technology development towards more multi-actor cooperation.

The main features of innovation ecosystems are also decisive factors that guarantee successful Smart Specialisation strategy creation and implementation. Innovation ecosystems usually include universities and research institutions, access to sufficient financing for new companies and new research avenues. It also includes a favourable combination of large established companies and new start-ups, specialisation of expertise coupled with cooperation among firms, industry and service companies which build on the specialized needs of local companies and a sufficient local market to support the launching of new innovative products, and secure global networking. Finally, it also includes a form of secure global networking, on top of explicit features which may apply to regional innovation strategies specifically. Hautamäki (2010) states that successful ecosystems have a "community of fate", meaning that the actors and (triple helix) stakeholders of the region realize that their success is linked to the success of the region as a whole. The cooperation that the Smart Specialisation strategy principle requires internally in the region and externally across regions leads to economic transformation. The collaborative implementation of the Smart Specialisation strategy is inevitably a way to enable the community of entrepreneurial activities to take place.

To monitor and assess results regional information is used as evidence in Smart Specialisation strategy. Such monitoring may extend to knowledge of the market, focus of the changes taking place in industry, competencies relevant to the region, actions in politics, culture and even

beliefs and values. These all affect the development of innovations and enhance new possibilities for technological and business development supporting the economic transformation of the region.

A description of innovation hubs and innovation systems indicates the region's ability to put the system for innovation into action. Smart Specialisation is a way to set the wheels in motion and create a strategically led environment to support innovation and economic transformation.

Smart Specialisation and EDP

Entrepreneurial knowledge is important in Smart Specialisation strategy process as it distinguishes S3 from traditional innovation policies by including private stakeholders. The entrepreneurial aspects constitute a bottom-up approach and a wide collective reflection process of the regional assets and possibilities, thus securing not only economic, but also social outcomes, while relying on policy and economic rationale. (Mäenpää, 2020:28; Ahlqvist, Valovirta & Loikanen, 2012; Mäenpää and Virkkala, 2014:4)

2.2 Smart Specialisation - Towards Economic Transformation

The aim of the Smart Specialisation strategy process is to boost innovation-led growth, nurture competitiveness, and reduce gaps between regions. In order to understand the application of Smart Specialisation as a strategic approach to innovation-based regional development and later be able to tackle the complexity of regional transformation processes in the Baltic Sea Region, it is helpful to map out the applicability of S3 generally in Europe. Some points on the objective of the Smart Specialisation strategy process can be made to then evaluate the transferability of theoretical approaches to innovation and place-based regional development to the Baltic Sea Region settings.

The transformation of the existing structure of the economy to a higher value added and innovation intensive configuration in a country or region was one of the major goals introducing Smart Specialisation strategies. Smart Specialisation strategies aim at confronting structural weaknesses through progress in three mutually reinforcing priorities:

- smart growth, based on knowledge and innovation;
- sustainable growth, promoting a more resource efficient, greener and competitive economy;
- inclusive growth, fostering a high employment economy delivering economic, social and territorial cohesion.

Ultimately, strengthening the economy and the innovation systems is done by selecting a limited number of priorities for national/regional development. Having a strategic and integrated approach to innovation maximises the European, national and regional research and innovation potential. Smart Specialisation strategies have proven their effectiveness and today continue serving the initial purpose. Countries and regions that already have gained experience in designing and implementing innovation strategies now support activities for revisiting and upgrading them.

The goal of Smart Specialisation has been widely described in EU publications starting with the Guidelines compiled by Foray et al. (2012). Smart Specialisation refers to the theory of economic transformation, and it is put into action as a policy

model (S3) which is based on this theory and as a worked out regional strategy (RIS3) (Mäenpää, 2020). As a regional policy document Smart Specialisation aims to fulfil the Smart Specialisation policy requirements as well as putting it into action. This study emphasizes that there is impact in both directions, from the policy to the regional strategy and from the actions of the strategy in practice back to the Smart Specialisation policy. Foray (2015) demonstrates three phases of a Smart Specialisation process: entrepreneurial discovery and spill overs, entry and agglomeration (clusters of companies), and structural changes. The focus is based on a wider view of innovation, rather than on specific technologies to be proven. Mäenpää and Virkkala (2014:4) suggest that the regional actors should focus on a "limited number of high-priority economic activities and that these should be based on empirical evidence, as the strategy aims to further enhance the existing knowledge base and regional based skills". Simply put, this means concentrating knowledge resources and linked them prioritized activities". The expectation is to achieve scale, scope, and spill overs as a result of a process of knowledge creation embedded in the strategic creation process.

All EU regions and Member States have applied Smart Specialisation approaches to their research and innovation policies as an ex-ante conditionality to access European Structural and Investment Funds in the 2014- 2020 EU programming period. In addition, regions outside the EU have adopted S3 approaches to focus their research and innovation investments in the fields with the highest impact and potential for competitiveness.

Table 1 Definition of RIS3. Source: Guide to Research and Innovation Strategies for Smart Specialisations

National/Regional research and innovation strategies for Smart Specialization (RIS3) are integrated, place-based economic transformation agendas that do five important things

- They focus policy support and investments on key national/regional priorities, challenges and needs for knowledge-based development, including ICT-related measures;
- They build on each country's/region's strengths, competitive advantages and potential for excellence;
- They support technological as well as practice-based innovation and aim to stimulate private sector investment
- They get stakeholders fully involved and encourage innovation and experimentation
- They are evidence-based and include sound monitoring and evaluation systems.

Smart Specialisation as a concept applies a place-based approach to regional development, as advocated in the Barca Report (Barca, 2009). Smart Specialisation trategies aim at prioritising public research and innovation investments. To select the priority domains for the economic transformation of regions a bottom-up approach is used, with the objective to build on regional competitive advantages. "The identification of these strategic priority domains for R&I activities needs to recognise the country/region specific context, analysing of the strengths and potential of the economy." (Teräs et al., 2018:10) In S3, specialisation and differentiation do not exclude each other, but are seen as complementary. To reinforce positive economic developments in a region, the Smart Specialisation strategy process also helps recognizing relevant differentiation. Each region is encouraged to identify new combinations between region-specific competencies and region-

specific opportunities (Foray, Morgan & Radosevic, 2018).

Smart Specialisation strategy includes the objective to build on new cross-sectoral synergies within and across regions to reinforce and diversify the regional economic portfolio based on identified competitive advantage. Smart Specialisation policy seeks to promote regional renewal by opening new growth paths and diversifying the economy into new domains of Specialisation.

All EU Member States and regions develop Smart Specialisation strategies to better focus their research and innovation efforts. The Commission established the Smart Specialisation Platform (S3P) to assist EU countries and regions in developing, implementing and reviewing their Smart Specialisation strategies by facilitating mutual learning, data gathering, analysis, and networking opportunities. The application of the S3 concept is continuously spreading into new domains and to new regions, even outside the EU. Among a total of 219 regions and countries that are members of the S3 Platform, 22 are outside the EU17. Furthermore, S3 has found applications on several continents outside Europe, most prominently in Latin America and Australia. In the European Arctic, many regions (such as Lapland, Finnmark and Nordland) are members of the S3 Platform.

The interregional and cross-border dimension of smart specialisation, facilitating the extension of local ecosystems and the scale-up of regional and local innovation, constitutes an important pillar for future research and innovation policy. The European Commission has set thematic S3 Platforms on industrial modernisation, energy and agro-food to help regions work together on their common and complementary Smart Specialisation priorities, benefit from new cooperation opportunities with partners from other regions, and accelerate the development of joint investment projects. These platforms provide a unique opportunity for policymakers at EU, national and regional levels to pool experience, combine complementary competences, and mobilise financing for new innovation investments.

2.3 Smart Specialisation for SDGs Implementation

The European Commission is working towards strengthening the connection between Smart Specialisation strategy and SDGs in the EU Member States. To this end the JRC is starting to develop a new methodological approach specifically for Sustainable Smart Specialisation strategies, targeted for EU member states. Starting in November 2018, the European Commission's Joint Research Centre (JRC) has been working to share the EU experience on Smart Specialisation strategies as one of the global methodologies for Science, Technology and Innovation (STI) Roadmaps for the achievement of SDGs, with a distinctive localised (place-based) approach and widespread application across EU regions. Practical examples of such Sustainable S3 at urban, regional and national level are already available and are shared on the JRC platform. Several regional examples of Smart Specialisation strategies linked to SDGs are included in the JRC platform as well as examples of international partnerships. This information can be found in the JRC Smart Specialisation Platform under S3

Beyond Europe and Sustainable Development Goals https://s3platform.jrc.ec.europa.eu/sustainable-development-goals. Events have been planned for 2020, though the global pandemic has caused delays starting from the beginning of March.

The European Commission has been committed to monitoring how European Member states' policies are addressing SDGs. As stated in 2019 in the Reflection Paper on Sustainable Europe 2030,[4] "we need to modernise our economy to embrace sustainable consumption and production patterns, to correct the imbalances in our food system, and to put our mobility, the way we produce and use energy, and design our buildings onto a sustainable path. To do this we also need to gear all our science, our financing, taxation, and our governance towards the achievement of the SDGs." Furthermore, "It is not enough to have a vision, we also need to agree on a concrete way to get there." As the reflection paper points out Smart Specialisation offers prospects for achieving a sustainable Europe in line with SDGs through cooperation:

The thematic smart specialisation platform for industrial modernisation offers opportunities to regional managing authorities with similar Smart Specialisation priorities to cooperate based on each other's competences, share infrastructure, allow scaling up to larger impact and develop joint investment projects.

Again, in the reflection paper on Sustainable Europe 2030 Smart Specialisation is mentioned first among the opportunities and drivers of Europe 2030 with regard to achieving the goal of sustainability and SDGs. The JRC platform makes available examples of local, regional, national and international partnership applications of Smart Specialisation as a localized and transformative STI Roadmap for SDGs. Examples of the regions are annexed in this study in Annex II. The JRC also includes examples of the International Smart Specialisation Partnerships in high technology farming[5], consumer involvement in agri-food innovation[6], nutritional ingredients and smart sensors 4 agri-food.

The JRC Smart Specialisation mechanisms are linking to the works of the Global Pilot Programme of the UN Inter-Agency Task Team on STI Roadmaps for SDGs to address the wider impact of Smart Specialisation strategy. Smart Specialisation for Sustainable Development Goals focuses not only on EU policy making but also aims at showcasing to the rest of the world how Smart Specialisation supports the implementation of SDGs. In addition, there has been a growing interest in adopting Smart Specialisation strategy as a reference approach to localised innovation-led transformation agendas in a number of countries outside the European Union and across the globe, accompanying an increased focus on SDGs as key framework for setting targets and aspirations.

The EU has published a European Handbook for SDG Voluntary Local Reviews as an inspirational framework to set up Voluntary Local Reviews (VLRs) for monitoring the SDGs at local scale. VLRs are a fundamental instrument offers to policy makers, researchers and practitioners to monitor progresses and sustain the transformative and inclusive action of local actors towards the achievement of the Sustainable Development Goals (SDGs) in general, and competitive sustainability in particular. International Smart Specialisation Industrial Modernisation is constantly being emphasized in European national and regional policy making based on innovation, creativity, knowledge and sustainability. This is in line with the UN goals to build on the role of traditional knowledge, potential impacts of emerging technologies, barriers for scaling-up solutions, and ways to ensure that science, technology and innovation benefits all, leaving no one behind.[7]

Originally the Addis Ababa Action Agenda[8] recognises science, technology and innovation (STI) as a means to achieve Sustainable Development Goals (SDGs). The EU and EU Member States

4 https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52019DC0022&from=EN

5 Link accessed on April 3, 2020 High Technology Farming.

6 Consumer Involvement in Agri-food Innovation.

7 https://sustainabledevelopment.un.org/?page=view&nr=3268&type=13&menu=1634. Workshop on Science, Technology and Innovation for the SDGs

8 Addis Ababa Action Agenda can be accessed in: https://www.un.org/esa/ffd/wp-content/uploads/2015/08/AAAA_Outcome.pdf

and regions together with UN institutions, the UN global pilot programme countries, and with other international institutions as well as experts and practitioners build up local policies by sharing experiences in how strategies have been implemented in practice. Cooperation between the European Committee of the Regions and the UN – Department for Economic and Social Affairs (DESA) are initial measures to extend discussions that can bring together two perspectives: firstly, the challenges and achievements in implementing Smart Specialisation strategy as localised roadmaps for transformation and for the achievement of the SDGs; and secondly, testing the emerging global methodologies and tackling sustainability challenges in the context of rapid technological change through discussions with UN stakeholders including UN- DESA, UNIDO, UNESCO, UNCTAD, the World Bank and countries involved in the UN Global Pilot Programme on STI Roadmaps for SDGs[9].

Themes that can help regional smart Specialisation strategies and SDGs build on each other can be derived from the UN Global Sustainable Development Report (GSDR) which focuses on using science, technology and innovation for accelerating progress towards the SDGs. The GSDR entry points indicate key areas for STI action in support of the achievement of the entire range of SDGs, in particular through addressing trade-offs, realizing synergies and accelerating progress towards the overarching objective of 'leaving no one behind'. The GSDR presented four levers of change (governance, economy and finance, individual and collective action, and science and technology) which can catalyse change across multiple SDGs by working through in six entry points: strengthening human well-being and capabilities; shifting towards sustainable and just economies; building sustainable food systems and healthy nutrition patterns; achieving energy decarbonization and universal access to energy; promoting sustainable urban and peri-urban development; and securing the global environmental commons. These entry points also indicate key areas for STI action in support of the achievement of the entire range of SDGs, in particular through addressing trade-offs, realizing synergies and accelerating progress towards the overarching objective of 'leaving no one behind'.

The outcomes of regional Smart Specialisation strategy expand these issues from a range of perspectives, such as human well-being and capabilities, and economic transformation transitioning to sustainable and just economies. Furthermore, regional strategies touch on GSDR entry points such as food and nutrition, energy, and cities. Global initiatives somehow related with regional and sectoral initiatives would include space technology applications for the SDGs (Space4SDGs), or GSDR entry point global environmental commons. New and emerging technology clusters are easily coupled with the SDGs either in through Financing and investing in Science, Technology and Innovation for the SDGs or through societal implications and ethical perspectives and initiatives.

This study presents some advances in the Baltic Sea Region in applying Smart Specialisation strategy as a methodology driving the achievement of the SDGs. St. Petersburg as a Baltic Sea Region territory of a non-EU country is included based on the choice to adopt the Smart Specialisation methodology as policy framework and/or reference methodology. During the course of the Smart-Up BSR project the focus in the participating regions on Smart Specialisation strategy was directed on the establishment and implementation of transformative localised, place-based, innovation-driven strategies/roadmaps. This includes how regions and cities that in their Smart Specialisation strategy creation work have found ways to target their Smart Specialisation strategies towards SDGs.

As mentioned earlier the JRC Smart Specialisation Platform gathers the current information on S3 and SDGs in the section S3 Beyond Europe which deals with SDGs among other non-EU aspects. At the time of writing in March 2020, information is provided on a small number of regions that have indicated how their Smart Specialisation strategies link to

9 Roadmaps for SDGs can be accessed in: https://sustainabledevelopment.un.org/tfm#roadmaps

the SDGs which they have chosen as their goal to achieve. Such regions are listed under 'Regional Inspirations' and they complement the information on International Partnerships formed around SDGs, and National Inspirations as well as Urban Inspirations. The International Partnerships cover areas related to Smart Specialisation strategies in Agri-food, comprising for example, traceability and big data. Of all the five agri-food related Smart Specialisation International Partnerships there are no partnerships comprising the Baltic Sea Regions, but rather the partnerships are spread out around the European territory including relevant clusters around Europe depending on the thematic cluster. The five currently set up International partnerships are linked to funding schemes like Horizon 2020.

Below are two examples from the Baltic Sea Region currently available on the S3 platform through information on Regional Inspirations (example: The South Finland Region) and on Urban Inspiration (example: the Finnish city of Espoo). SDG implementation is also on the agenda of the city of Helsinki, as the Helsinki 2019 strategy acknowledges: "… the significance of cities as solvers of current major global challenges will inevitably increase. Cities are solution-oriented, pragmatic and agile as they seek solutions to the challenges of social segregation, climate change, energy". (City of Helsinki, 2019)

In addition to the Six Cities Strategy in Finland, other European cities can be presented as examples of existing efforts to link Smart Specialisation strategy with SGDs such as Sofia, in Bulgaria. From the list of Regional Inspiration, the following regions can be mentioned: Abruzzo, Puglia, Catalonia, Northern Netherlands, Lapland, and South Finland (see above). Among the National Inspirations the countries mentioned are Croatia, Poland, Malta, Cyprus, Norway, Serbia, Australia.[10]

EXAMPLE 1: S3 and SDGs in South Finland

South Karelia's RIS3 supports the systemic transformation towards a low carbon economy through "Increasing material efficiency and clean energy adoption for sustainable development".

The core regional competences rely on the strategic alignment with LUT University, which is the top energy research university in Finland. South Karelia's RIS3 builds upon competences from different areas, among other, energy water management, environmental science and sustainable business. A key idea is to develop solutions that can make the difference at the global level, after pilot phases in the region. Local municipalities and companies are committed to cooperate with universities to achieve this goal. In practise this is done through offering public investments as experimental environments for innovative ideas whenever it is possible.

The region aims at developing local solutions that are globally scalable. This is done in cooperation across industry, public sector and research and education organisations. South Karelia has a strong natural resource intensive industry that is a key partner for developing and testing industrial scale solutions.

There are ongoing works on RIS3 for the next programming period 2021-2027. The strategy is already well aligned with ecological and economic sustainability goals but more attention needs to be put on the social and community aspects.

Main SDGs target in the Smart Specialisation strategy of South Karelia:
SDG 6. Clean water and sanitation
SDG 7. Affordable and clean energy
SDG 9. Industry, Innovation and Infrastructure
SDG 11. Sustainable cities and communities
SDG 12. Responsible consumption and production
SDG 13. Climate action

Source: https://s3platform.jrc.ec.europa.eu/sdgs-in-south-finland

10 For regional and urban inspiration to integrate SDGs in S3 consult the S3Platform in https://s3platform.jrc.ec.europa.eu/sdg-regional and in https://s3platform.jrc.ec.europa.eu/sdg-urban

EXAMPLE 2: The Six City Strategy strives to enable growth in sustainable manner in the six biggest cities of Finland. The social aspect is embedded in operationalisation of the strategy in terms of open participation, co-development, equal opportunities and non-discrimination, and equality between men and women. The objective is that collaboration between diverse groups of stakeholders will reinforce the regional innovation system so that the knowledge base continues to expand. New knowledge is needed to address the global challenges such as climate change, ageing population, and urbanisation. In the centre there are the human being and his/her need to have a good life in a safe and sustainable environment for living, learning and working.

Thematically the emphasis of the Six City Strategy is on circular economy, mobility, learning, employment as well as health and wellbeing services. In particular Sustainable Development Goals (SDGs) 4, 7, 8, 9, 11, 12 and 13 are interwoven with the objectives of the Sustainable urban development strategy of the Six Cities. Moreover, priorities that have been identified in the smart specialisation strategies include for example Urban Clean tech, Digitalising Industry, Citizen City and Health and Wellness, Digital Manufacturing, Smart City Solutions, Circular Economy, Blue Growth and Industrial Modernisation and ICT and Software Applications for Industry.

The cities have also set ambitious goals to become carbon neutral, for some of them as soon as 2029. However, cities cannot address these issues alone, cooperation with the education sector, businesses and citizens is essential. By developing and testing the solutions in real life settings, companies also discover opportunities and new prospects in the global markets. New smart city solutions are based on data, digitalisation and co-created in close collaboration with cities, companies, research and development organisations and citizens (quadruple helix) in open innovation platforms. New partnerships and community driven bottom-up approach challenge the cities' role and operating models and force them to be more open and agile. This also shows as a switch from a linear innovation process to open innovation processes, engaging different stakeholders in the development work.

ENVIRONMENTAL AND ECONOMIC SUSTAINABILITY
SDG 7 + Smart Specialisation objectives: Sustainable innovation, Digitalising Industry

Energy Wise Cities project (6Aika pilot projects): the main objective of the project is to elevate the cities involved into internationally aspirational areas in energy efficient living, zero-energy construction, the implementation of a multiform energy system, monitoring energy-efficiency and user guidance. Examples of objectives are:

- The creation of a simulation model that enables the design and implementation of a regional energy-wise area and quarter connected to the rest of the energy grid via intelligent control systems.
- The development of concepts of intelligent and energy-wise buildings, the identification of essential data flows for the optimal control of the building and the development of data collection for depicting the use of the building in cooperation with companies.
- The promotion of new business opportunities and energy efficiency partnership models in order to achieve the objectives of the national energy efficiency agreement.
- The development of city planning tools for designing areas closing in on zero energy as well as the overall optimization of regional energy systems.

Climate-friendly Housing Companies project (6Aika pilot projects): It aims to improve energy efficiency through the utilisation of data collected with the help IoT. The project involves testing IoT sensors to collect observations that can provide a better understanding of a building's energy efficiency. To analyse these observations, the project is seeking service providers capable of refining this type of data into concrete recommendations for long term planning, for example. The project focuses particularly on questions of ownership of data and making sure that residents have a genuine opportunity to decide on where the data collected from their flat ends up.

SOCIAL SUSTAINABILITY
SDG 8 + RIS3 Objectives employment and competences
Gametime (6Aika-pilotproject): it supported the employment and study guidance of young people between the ages of 17 and 29 in Oulu and Tampere through Pelifarmi coaching programmes. The coaching programmes focused on building personal paths towards employment for young people. The project supports the employment of young people. Additionally, the project aimed at diversifying the operating preconditions of game development companies, utilising research-based information in the game development industry, increasing young people's awareness of educational opportunities and lowering barriers to education and training.

The impact of the Pelifarmi coaching programmes on the lives of the young people participating was studied by the Finnish Youth Research Network. A conclusion of the study was that in addition to game development skills, the group work and lessons that young people participated in during the programmes provided them with networking opportunities and knowledge of their own strengths, among other benefits. The study also found that the Pelifarmi coaching improved the overall well-being of some of the young people participating as a social community. The project developed cooperation between game industry companies, educational institutions and cities. The project allowed companies to establish contact with potential employees.

Main SDGs target in the Smart Specialisation strategy:
SDG 4. Quality Education
SDG 7. Affordable and clean energy
SDG 8. Decent Work and Economic Growth
SDG 9. Industry, Innovation and Infrastructure
SDG 11. Sustainable cities and communities
SDG 12. Responsible consumption and production
SDG 13. Climate action

Source: https://s3platform.jrc.ec.europa.eu/sdgs-six-cities

3 BALTIC SEA REGION SMART SPECIALISATION STRATEGY STORIES AND ANALYSES

3 BALTIC SEA REGION SMART SPECIALISATION STRATEGY STORIES AND ANALYSES

In this section we explore the course, or practice, of Smart Specialisation strategy creation and revision with a focus on the Baltic Sea macro-region. The aim is to share practices in order to understand the challenges which regions located around the Baltic Sea face. The regions of the Smart-Up BSR project present their stories from the perspective of the Smart Specialisation strategy process 2014-2020 and speak of their experiences with Smart Specialisation strategy creation.

Regional challenges are often, but not only, related to disparities between urban and remote locations. These, in general, lack critical mass and encounter obstacles when actors in governance and implementation are not aligned. In some less central areas, the regions are characterized by dependence on few dominant industries which are coupled and contrasted with densely populated knowledge hubs in the domain of high technology located mainly in capital metropolitan areas. The stories move within the framework laid out in the introductory part of this book. The idea is to remove current assumptions of a well-balanced unified Baltic Sea area. Contrary to common belief, a closer look reveals how each region differs and is undergoing a process of alignment while operating within its particular administrative and territorial set up.

Figure 4 Baltic Sea Regions comprising the Baltic Sea Macro Region

Smart Specialisation Policy Landscape in the Baltic Sea Region

Although Smart Specialisation strategy is a regional policy tool, in some of the Baltic Sea Region countries the strategy processes have been led by the national governments and have a national perspective. One of the reasons is related to EU Cohesion Policy and how the EU classifies regions. There are three levels of administrative units in the EU based on the size of the population. The following table resulting from the Regulation (EC) No 1059/2003 of the European Parliament and of the Council shows how administrative units in the EU are classified.

Table 2 EU Administrative Units. (EC No 1059/2003)

Level	Min.population	Max.population
NUTS 1	3 million	7 million
NUTS 2	800 000	3 million
NUTS 3	150 000	800 000

The Cohesion Policy of the EU targets NUTS 2 level regions, especially the ones where GDP per capita is less than 75% of the EU average. Some of the Baltic Sea Regions have small populations, e.g. Estonia with 1.3 million inhabitants, and are therefore considered as a single NUTS 2 level region in the EU. The regional facts and profiles in the strategy stories are compiled according to the specific territory's specification as follows: The key indicators that are relevant to describe a region's

level of competitiveness in innovation are extracted from several indexes: the Regional Innovation Scoreboard (RIS), the European Innovation Scoreboard (EIS), the Cultural and Creatieve Cities Monitor (CCM).

3.1 The Baltic Sea Region as a Macro Region

Smart Specialisation as a way to increase competitiveness in European Sub-regions has a clear impact on collaboration in Macro-regions. The success of implementing sub-regional strategies is best achieved through cooperation within the surrounding sub-regions and countries.

In the Baltic Sea Region this coordination is done within the framework of the EU Strategy for the Baltic Sea Region (EUSBSR) which is set up to tackle topical challenges on a macro-regional level. Many challenges in the Baltic Sea Region are common for several countries and have a cross-sectoral nature. Possible solutions to these challenges benefit from being addressed together by various countries and sectors. [11]

The EUBSR Annual Forum 2020 will facilitate a stronger dialogue among stakeholders from different countries and sectors. The aim is to form innovative constellations to find common approaches, which will contribute to the three objectives of the Strategy; Save the Sea, Connect the Region, Increase Prosperity. [12]

An overview of the four Macro-regions is presented in the Culture and Creative Cities Monitor 2012. Macro-regional performance as measured by the average scores of the C3 Index of all the sampled cities located in northern, southern, western and eastern Europe (see the Lexicon for the definition of Europe's macro-regions) shows that Northern Europe make up the top performing area, closely followed by western Europe and, at a certain distance, by southern and eastern Europe. However, a quite different picture emerges when looking at the average scores at sub-index level (Figure 5).

On 'Cultural Vibrancy', western Europe leads closely followed by both northern and southern Europe. Western Europe is also the top performer on 'Creative Economy', with northern Europe coming close behind. Eastern Europe, coming third on 'Creative Economy', performs slightly better than southern Europe. It does not probably come as a surprise that the best 'Enabling Environment' is instead found in northern Europe. Western Europe follows, with a five-point difference in the average score, while southern and eastern Europe come third and fourth respectively with a very similar score.

3.2 Smart Specialisation Strategies in the Baltic Sea Region

In the Smart Specialisation Platform, the Baltic Sea Region is represented in the section that details EU macro-regional strategies. In addition to the Baltic Sea Region three other macro-regions are grouped, the Adriatic-Ionian Region, the Alpine Region, and the Danube Region. For the purpose of Smart Specialisation cooperation eight countries are clustered (Sweden, Denmark, Estonia, Finland, Germany, Latvia, Lithuania and Poland) as they share common features and challenges. In addition, Norway, Belarus and Russia are welcome in the collaboration. The EU Baltic Sea Region counts 85 million inhabitants (17 percent of the EU population).

11 https://annualforum2020.eu/en/11th-annual-forum-eusbsr-20-october-2020-online/programme/workshops

12 https://annualforum2020.eu/en/11th-annual-forum-eusbsr-19-20-october-2020-turku/programme/workshops

The geographic location and natural conditions of the Baltic Sea basin entail certain challenges, but nonetheless the region has succeeded in economic development and innovative capacity. The European Regional Innovation Scoreboard data testifies that Baltic Sea regions are developing in pace with and comparable in in averages on key indicators for Europe. Some Baltic Sea regions have taken an innovation-leader's position in several industries. While technology is an area that has proven high levels of innovative capacity, beyond technology related fields the Baltic Sea regions show key high value development in bio-economy, mining, metallurgy related fields including innovations in domains related to for example, climate, forestry and fisheries.

The coordination of appropriate policies fit to tackle common Baltic Sea Region challenges is based on the 2009 EU Strategy for Baltic Sea Region (EUSBSR). The strategy encourages cooperation between stakeholders in the BSR and initiatives for the coordination of strategies across the Baltic Sea Region.

While Smart Specialisation coordination is a relatively new tool for the Baltic Sea Region innovation strategy, the EU Strategy for the Baltic Sea Region as a macro-region builds on long traditions of collaboration and on established cooperation in

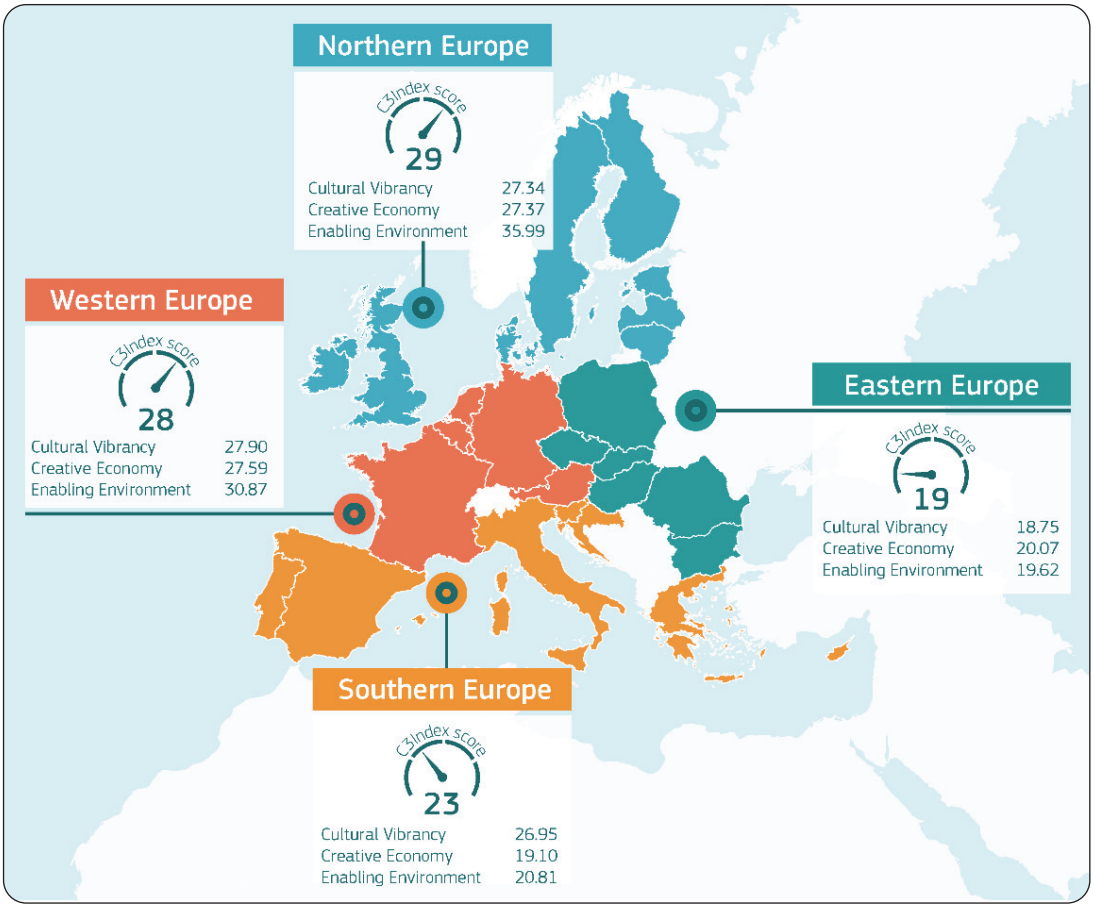


Figure 5 Cultural and Creative Cities Monitor (CCM) 2019 Overview of Macro-regions [12]

13 The Cultural and Creative Cities Monitor, 2019 edition, p. 33. https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/cultural-and-creative-cities-monitor-2019-edition.

the field of innovation among the countries. The Smart Specialisation strategy process can leverage on this and has given the opportunity for various trans-national R&I collaborations. Also, different mechanisms for co-financing of activities have been tested.

As emphasized in the Smart Specialisation platform the potential to mobilise relevant stakeholders and create strategic innovation partnerships is higher at macro-regional level. Macro-regional strategies aim at bringing together stakeholders from different policy levels and sectors and thus facilitate synergies and align divergence. Although the Baltic sea is one of the most interconnected multinational areas in the world, the governance structure is highly complex. (EUSBSR blog, March 13, 2020) The Horizontal Action between Baltic Sea Region countries has been set up by EUSBSR to tackle the disparities between regions. "There are many different cooperation frameworks with overlapping interests. There are a huge variety of ways, in which it is possible to approach any given issue and in each area of cooperation the network of actors is different. Each country in the region has a slightly or sometimes massively different decision-making structure and it is sometimes just difficult to find the correct organisation in a neighbouring country that has the authority to affect change in a policy area". (EUSBSR blog, March 16, 2020) How is this addressed in the context of Smart Specialisation strategy in the Baltic Sea Region?

The existence and persistence of regional disparities between Baltic Sea regions require context-tailored policies to promote structural change. For the Smart Specialisation strategy work in the Baltic Sea Region to be effective continuous dialogue and cooperation among the countries needs to be enabled. Although Smart Specialisation strategies are linked with the conditionality to funding for the European Union countries around the Baltic Sea basin, many of the common issues can only be addressed in constructive cooperation with non-EU neighbouring countries. These are closely linked by trade, tourism, and rivers flowing into the Baltic Sea. By coordinating dialogue and cooperation the Smart Specialisation strategy process enables practical and beneficial cooperation in the framework of both the overall strategic guidelines and the thematic Smart Specialisation priorities. For these reasons, it is highly important to have strong and confident ties among the Baltic Sea regions and nations, and jointly tackle common challenges. Smart Specialisation is a strong tool to mobilise this cooperation increasing the development potential of the Baltic Sea region. Yet, differences and divergences exist, and general Baltic Sea Region Smart Specialisation strategic goals can be examined to understand how to align cooperation. The project Smart-Up provided continuous interaction between stakeholders through a series of innovation camps organised over the span of three years. During Smart-Up innovation camps, participants worked around challenges put forward by challenge owners in the Baltic Sea cities and regions.

The Baltic Sea Region Smart-Up cooperation has focused on four challenges:

- Boost inclusive regional economic transformation
- Engage inter-regional collaboration
- Boost entrepreneurship and entrepreneurial discovery process
- Save the Baltic Sea and tackle grand societal challenges

The Smart Specialisation strategy process provides a tool to develop actions that tangibly contribute to finding strategic solutions for a future transformation of the region. The four challenge areas are explained below.

Boost Inclusive Regional Economic Transformation

How can we make the development of our regions inclusive and thus secure a coherent social and economic basis to boost economic transformation? How do we engage diverse stakeholder in the Baltic Sea Region to increase action based on Smart Specialisation strategies and thus drive economic transformation forward? For example, strategies can be made actionable is projects such as the Smart-Up BSR project. Among the Smart-Up

BSR project partners universities, municipalities, ministries and agencies from the Baltic Sea Region have exchanged, assessed, revised and recommitted strategy work across regions. To all the Innovation Camps that were conducted youth and other interested parties were very encouraged to participate in order to have much broader perspective and inclusion for better perspective solutions.

Engage Inter-regional Collaboration in the Baltic Sea Region

How can the Baltic Sea Regions engage and collaborate across regional borders with the strategic aim in mind of increasing Baltic Sea international competitiveness? How can we create, develop, and leverage on the spearhead initiatives in the macro-region by jointly participating in strategic pulpable action? Common initiatives and information sharing leads to better solutions nationally and regionally. That is particularly the case for the emerging priorities as demonstrated in the Smart-Up BSR project, such as climate change, circular economy, smart cities and healthy aging.

Boost Entrepreneurship & Entrepreneurial Discovery Process

How can we boost entrepreneurship and start-ups in the Baltic Sea Region? How can we operationalize ways to create value with the entrepreneurial discovery process in the Baltic Sea Region? Engaging stakeholders from different environments and at different levels (policy, academia, municipalities, research and state development agencies) could lead to agreements on concrete measures that would pave the way to discovering potentially commerciable or implementable new services, projects or products. The Smart-Up BSR project has tested this through Innovation Camps as a platform where stakeholders listen to each other and generate ideas together by rethinking their priorities. Innovation Camp interactions have applied the Innovation Camp methodology to facilitate the emergence and growth of new activities and identify potential opportunities. The Smart-Up BSR network also has helped to accelerate and validate entrepreneurial ideas regionally practicing the strategy creation and revision process at times of high uncertainty.

Save Baltic Sea and Tackle Grand Societal Challenges

How to tackle grand societal challenges like climate change, circular economy, and healthy ageing? Through Smart Specialisation as a macro-regional platform strategic resources and competences can be easily identified. Such strategy processes can benefit regions when taking place as a macro-regional collaboration practice. The reason is that a macro-regional perspective has not only the potential to lock in a wider range of actional plans, but also, when operating in practice based on inclusive strategies, it is able to enhance trust to attract relevant partners to local businesses. As a result, tackling grand societal challenges becomes a tangible strategic advantage for the local partners in practice.

3.3 Baltic Sea Region Strategy Stories Analysis Framework

To date 180 Smart Specialisation strategies have been produced across the EU. This compilation looks at the variety within the Baltic Sea macro-region from a Smart Specialisation strategy creation and update perspective.

The Strategy Stories expose the role that the Smart Specialisation strategies take within the strategic policy work for economic transformation in the Baltic Sea Region countries. Through the lens of the Regional Strategy Diamond for Economic Transformation each regional set-up reflects how the managing authorities have used and are planning to use the Smart Specialisation concept in developing, revising, and updating their own innovation-driven economic transformation agendas at national and regional level.

The Strategy Stories and the analysis are presented in alphabetical order by country. With a few exceptions most of the Strategy Stories have a regional focus. In some cases – when a country is small and does not have a subdivision in regions, or the regional perspective covers the whole country – then the focus is national. However, some of the countries have provided an additional perspective through city cases: the City perspective is available for Aarhus, Tallinn, and Klaipėda. As the compilation was made possible through the collaboration within the Interreg project Smart-Up BSR, the selected material reflects the work of the project partners, the organisations they represent, and the innovation ecosystems they are part of in their respective regions. The strategy stories may reflect a difference in mandate between the organisations represented, however each of the participating partners has a very well-established network of actors at different levels of governance and they have direct access to information on policy related operations.

Structure of the Strategy Stories

The structure of each Strategy Story follows the same pattern. After an introduction to the region follows the presentation of the region's Innovation Index and regional indicators. A general profile in figures are attached in Annex IV, and graphs illustrating the development of some key innovation indicators over time are provided in Chapter 4. The core section of each story looks at the content of the Smart Specialisation strategy. Special attention is also given to The Smart Specialisation Priority Areas, and updates through the Revision of the Smart Specialisation strategy. Following the strategy content presentations, each strategy looks at how the region has tackled The Smart Specialisation strategy Process, the Stakeholder Involvement, the Monitoring Mechanisms. Each story closes with an analysis based on the five angles of the Regional Strategy Diamond.

Innovation Index and Regional Indicators

Each Strategy Story introduces the region in question with selected regional facts and key indicators retrieved from several indexes. Mainly the Regional Innovation Scoreboard (RIS) is used as it provides figures at regional level and its innovation dimensions support the needed facts for Smart Specialisation strategy creation. The European Innovation Scoreboard (EIS) is used when a subregion at NUTS 3 level is not measured in RIS, or when a specific country has decided for a national approach to Smart Specialisation. In cases when the subregion is not available the Regional Innovation Index (RII) of the larger region comprising the subregion is measured. The Baltic countries mostly have a national approach, therefore the country's innovation index from EIS is used. The EIS dimensions that constitute the summarized innovation index at the country level correlate almost completely with the criteria for the RII. The difference between the two scoreboards is rather a difference in granularity than a qualitative difference.

Of the 17 RII dimensions which RIS uses to describe the innovation capacity of a region, six charts are selected to be presented in detail. These six criteria are applied to all regions in this study as having significance for the Smart Specialisation

strategy. They illustrate the development in the region with regard to those specific dimensions over the years 2011, 2013, 2015, 2017, and 2019. In order to have comparability between all regions the same six criteria are highlighted for each region's Smart Specialisation strategy Story. As regions have individual contextual features it may also have been interesting to look individually at the specific dimensions that show particular excellence, or that underline a specific gap, in a region in particular. However, with comparability in mind a unified approach was chosen. The yearly development of the rest of the dimensions can easily be obtained through the link that is provided in the general profile summary at the end of each Strategy Story.

The extracted charts represent the following key innovation areas: Lifelong learning, Innovative SMEs collaborating with others, Public and Private R&D expenditures, SMEs innovating in-house, Non-R&D expenditures. The results show how these dimensions may have contributed to the increase or decrease in performance of the RII of the region in question. Interestingly, regions with a similar RII score may in fact show different textures of regional competitiveness, resilience, and innovation.

Additional information (JRC S3 platform, Regional Innovation Observatory, SDG Voluntary Local Reviews, Cultural and Creative Cities Monitor) describing the positioning of the regions in their national or local as well cross-regional environment is attached at the end of each strategy story. The Cultural and Creative Cities Monitor (CCM) with its 29 dimensions could present the opportunity to look at a different angle of innovation, however, even if cities play a key role, in this study the perspective is regional and therefore the innovation performance analysis is based on the European/ Regional Innovation Scoreboard. End regional strategy story ends with a Regional Profile, providing a general summary of the regional macro-economic indicators including source links.

Revisiting the Smart Specialisation Strategy

As all EU countries are preparing for the next financial period of 2021-2027, the new round of preparation of Smart Specialisation is currently taking place and will produce revised strategies in the nearest future. During the updating process of Smart Specialisation strategy in 2018-2019, several countries and regions prepared the documents that serving as a base for the next qualitative round of new generation Smart Specialisation. This includes not only statistical analysis, monitoring data, and new perspectives of EU policies in Smart Specialisation areas, but also rich experience and lessons learned. Some of these documents have been available at the time of writing the stories, but final revised strategies were still in the approval process. Most of the documents could therefore not be translated and did not allow referencing to final revised strategy content and priority formulations.

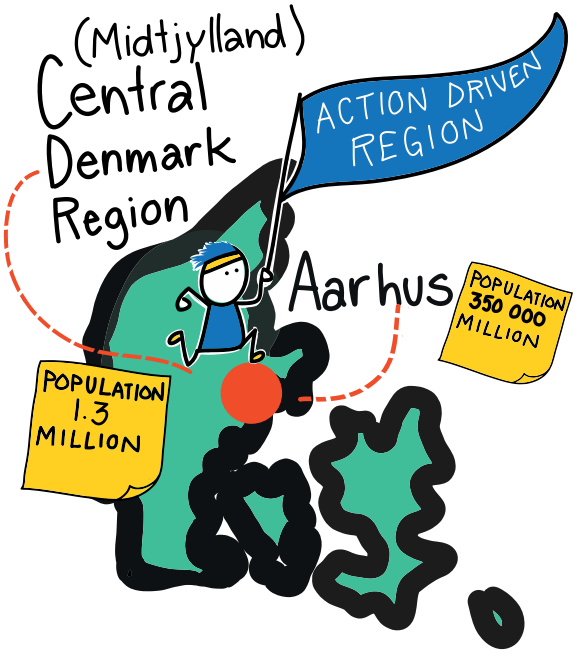
Even if the current period of implementation of Smart Specialisation strategy had not finished yet in most of the regions at the time of writing, it was considered important to include ongoing discussions on the new Smart Specialisation period and possible consideration on changes of priorities. The main focus in the section on revision of the Smart Specialization strategy was on:

- Considering the scope of priorities and including focus on horizontal impact
- Considering to what extent priorities need equal attention and foresee different levels of implementation and monitoring mechanisms.
- Ensuring continued stakeholder engagement (spec. science and business) in the process
- Providing interim evaluation and opportunity to adjust priorities

Analysis of the Regions' Smart Specialisation Strategy Stories

In the analysis the Baltic Sea Region Smart Specialisation strategy stories are first cut through the five angles of the Regional Strategy Diamond (Figure 3 in Ch.1.2) and then each region is presented as a visualization of the diamond based on the results of the analysis. For a description of the Regional Strategy Diamond for Economic Transformation please refer to the section 1.2 in this document on the methodology of the study. A cross-regional analysis is then presented in the findings. Together these Strategy Stories and their respective diamond cut reflect the Baltic Sea Region modes of applying Smart Specialisation strategies at regional and national level and indicate some macro-regional perspectives.

3.4 DENMARK, AARHUS – Action Driven Region



Aarhus is part of the Central Denmark Region (Midtjylland), one of Denmark's five regions. Midtjylland stretches across the central part of the peninsula of Jutland and covers 19 municipalities. Approximately 1.3 million people live in this region. With a population of 350.000 citizens Aarhus is the largest city in the region and the second largest city in Denmark. The Central Denmark Region is known for its large business areas within foodstuff, advanced production, Greentech, IT, transport and logistics, finance, design, fashion & furniture, construction, consultancy and tourism. In 2012-2017 the business areas with the highest growth rate was within animation, game development, film production, construction, IT, advanced production, and life science & welfare technology. The region is also a "4 stars" Reference Site of the European Innovation Partnership on Active and Healthy Ageing.

In 2017 Aarhus was the European Capital of Culture, which was a collaboration with the entire region. Aarhus is internationally known as an innovative smart city, the municipality acts with an open mindset and supports other municipalities and stakeholders by paving the way. The municipality of Aarhus seeks, whenever possible, to create solutions as open source, in addition all experiences and insights are shared with other municipalities. Many examples showcase Aarhus Municipality's role as a first mover regarding the application and exploration of new technologies into the public sector and urban environment. Aarhus Municipality was the first municipality in Denmark to establish an Open Data platform and was instrumental in establishing the national open data initiative Open Data DK. Aarhus is also currently a national testbed for Precision Positioning and Autonomous Systems. Actively operating as a testbed for new innovative solutions and technologies is one of the strategic goals of the city's Smart City strategy. Aarhus University is also one of the driving forces of the Smart City activities in the region.

Regional Key Indicators for Central Denmark

The Central Denmark Region is in the group of top innovators in Europe as Innovation Leader. (RIS, 2019) With a score of 127,3 it is ranked as Leader – in the performance subgroups and occupies the 24th rank of all innovative Leader regions in the EU. The Municipality of Aarhus has been a key driving force and is committed to pave the way towards innovative approaches and solutions. The role of Aarhus is mapped out below in the Smart Specialisation strategy section.

As a way of introducing the context of the Smart Specialisation strategy in the Midtjylland region we track the Regional Innovation Index (RII) as calculated in the Regional Innovation Scoreboard over the period 2011-2019. The two graphs below present the regional score development RII 2011-2019 (Figure 6) and the breakdown of the RII as a regional profile based the 17 measured dimensions (Figure 7). The table lists the dimensions which constitute the RII in order of performance for 2019 with reference to 2011. The represented area is Midtjylland, the Central Denmark Region, at

NUTS 2 level. A general summary of the regional macroeconomic indicators of Midtjylland is attached in Annex IV.

Though Midtjylland occupies a top ranking – the region scores 127,3 out of the European baseline of 100 for EU-28 in 2019 – the RII over time indicates a decreasing tendency since 2013. The innovation performance is -2,2 relative to the 2011 performance. This is not a unique situation for Central Denmark Region as all but one of the five Danish regions showed a performance decline in 2019. The table indicating the performance by the individual measured dimension shows which are the specific areas that need improvement. Given the fact that the 2019 RIS reports on measurements from the year 2017 the actual influence of the Smart Specialisation strategy on the regional performance will be seen in the next reporting period.

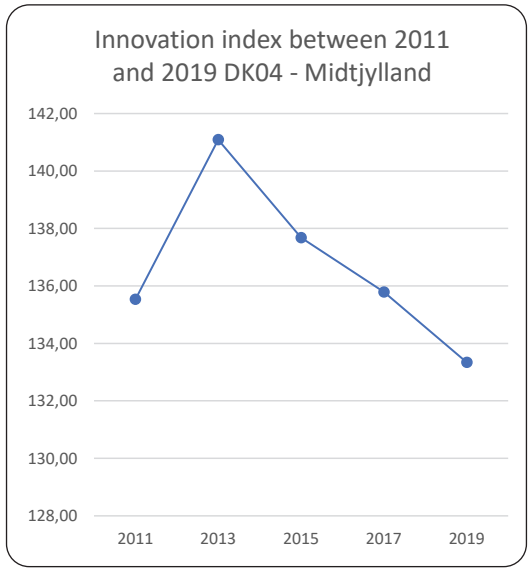


Figure 6 RII of Midtjylland 2011-2019

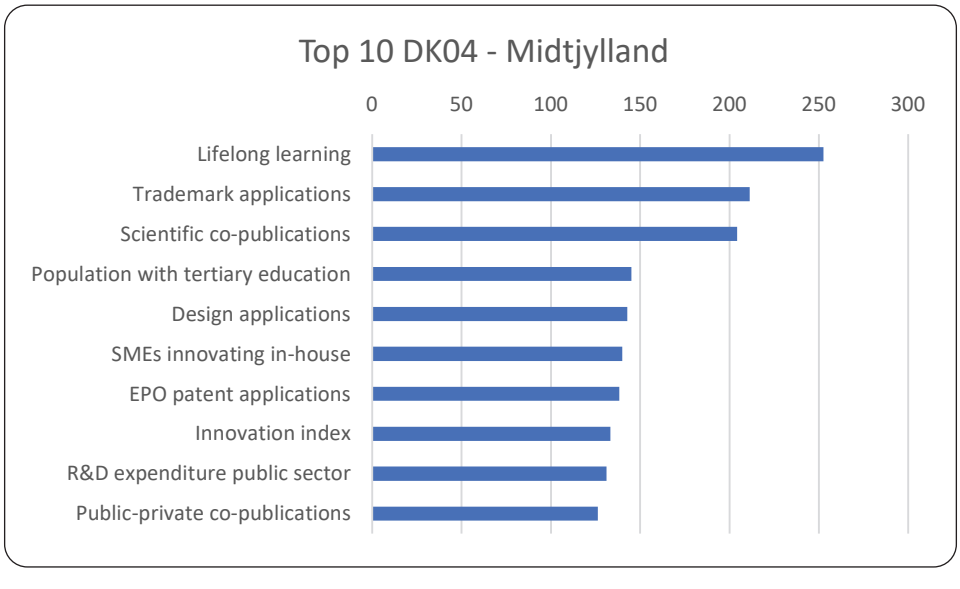


Figure 7 Midtjylland Profile According to the 17 RIS Indicators

Within the list of the 17 criteria of the Midtjylland innovation index three stand out as very strong (lifelong learning, trademark applications, scientific publications). The robust innovation areas of the region are related to the strong presence of education and science, which also influences trademark and patent application.

The business sector investments and product or process innovators as well as new-to-market sales contribute least to the RII of the region and represent the areas needing improvement. Sales of new-to-market and new-to-firm innovation have a surprisingly low position and pull down the resulting performance.

Graphs illustrating in more detail the development of some specific criteria over the years 2011, 2013, 2015, 2017, and 2019 are included in In chapter 4. The selected tables show the development in the following key innovation areas: Lifelong learning, Innovative SMEs collaborating with others, Public and Private R&D expenditures, SMEs innovating in-house, Non-R&D expenditures. The chosen graphs in the chapter 4 show that the particular dimensions are in fact on a slow rise with reference to 2011 and 2013, though the actual RII score still shows a slight decrease.

The outcome seems to indicate that the business-related activities including the challenges of putting new products on the market need more attention and the Smart Specialisation strategy needs to take this into consideration when choosing the areas of development.

Smart Specialisation Strategy in Denmark and Central Denmark Region

Some of the key achievements of the current Smart Specialisation priorities can be identified by looking into the effects of The European Regional Development Fund (ERDF) and The European Social Fund (ESF) in the status report from 2018 for the programming period 2014-2020. In this period ERDF and ESF will have invested ~400 M euros in boosting economic growth and increasing job creation in Denmark by focusing on SMEs, and in improving workforce qualifications of the workforce. From 2014-2018 the structural funds have co-financed 211 projects with 240 million euros and covered "a wide field from e.g. innovation partnerships between private enterprises and knowledge institutions, counselling of entrepreneurs with the aim of improving their growth potential, green development within SME's, competency boosts and formal education of the work force as well as inclusion of marginalised citizens" (p. 1, Citizen Summary 2018). Here are some of the main achievements:

Table 3 ERDF and ESF Achievements in Denmark

ERDF
- 73 innovative companies have been established.
- 350 new growth companies and around 8,000 new private full-time jobs are expected to be created.
- 6,000 tons (CO_2 equivalent) are expected to have been reduced from 7 energy efficiency and resource efficiency projects.

ESF
- 1,200 participants have established a business from participating in entrepreneurship activities.
- 8,700 individuals have been registered in the EURES CV bank, and 15,600 job seeking candidates have been matched with job vacancies in Danish companies.
- 350 participants in social inclusion activities have so far started an education and 300 people have been employed.
- 3,788 young people has been helped to start a vocational education.

It is important to note that the Danish administrative structure governing the regional economic development has traditionally had an exceptional configuration in comparison to other countries with regard to Smart Specialisation. The difference in organizing regional economic development has been acknowledged and in practice it has functioned on an equal basis with the organization of Smart Specialisation. However, a recent national reorganisation in 2019 brings a different quality to the work of developing and implementing regional strategies. The regional restructuring that taken place in 2019 is showcased here based on the Central Denmark Region example. The changes in the Central Denmark Region indicate

how the redesigned Danish regional development is currently affecting the future organization of regional Smart Specialisation strategies, their implementation, and future updates.

The new setup resulting from the restructuring aims at a new distribution of responsibilities around the business support system at local, regional, and national level. The new structure in place since 2019 gives the national unit called the Danish Executive Board for Business Development and Growth, later called the Board, rather than the Danish Regions the responsibility for regional growth, innovation, and business support related activities. This includes the work associated with regional development and Smart Specialisation strategy.

For 2019 the Board put in place an intermediate decentralised business support strategy, which was based on – and also replaced – the existing growth and development strategies of the regions, thus affecting the Smart Specialisation process. Since spring 2019 the Board has been developing the content for the new strategy from 2020-2023. This new decentralized business support strategy was sent into public hearing in November 2019. The priorities listed below represent the strategic choices of the draft version that is now in the public hearing process. A more detailed description is given in the Strategy Process section.

Priority Areas and Spearheads for the Central Denmark Region

The priorities for the Central Denmark Region correspond to the existing Smart Specialisation priorities published in the JRC S3 Platform for the region, with the addition of the "Healthcare and welfare technology" priority, which was originally among the national priorities. As a result of the restructuring the Smart Specialisation strategy priorities are incorporated into the Danish business support strategy. The set of priorities described in the intermediate decentralized business support strategy of 2019, are divided in two areas: national cross cutting priorities and decentralized needs and potentials for each region.

Table 4 Danish National S3 Priorities and Regional Needs and Potentials

Smart Specialisation National Cross-cutting priorities
- Digitisation and new technology adoption
- Qualified labour for local needs
- Green and Circular transition
- Clusters and Innovation partnerships
- Entrepreneurship and Growth ambitions
- Internationalisation and cross-border collaborations

Smart Specialisation Central Denmark Region Needs and Potentials
- Food
- Energy and climate
- Smart Industry
- Creative Industries
- ICT
- Tourism
- Healthcare and welfare technology

Table 5 National Drivers, Priorities and Future Business Clusters

National Drivers for Growth and Development
- Qualified Labour and social inclusion
- Entrepreneurship
- Green transition and circular economy
- Innovation
- Digitisation and automation
- Internationalisation

National Priorities and Future Business Clusters
- Environmental / Sustainable Technology
- Energy Technology
- Food and Bio resources
- Maritime industry and logistics
- Life Science and welfare tech
- Construction
- Design, fashion and furniture
- Advanced Production
- Digital Technologies
- Finance and Fintech
- Tourism
- Robot- and Drone technology
- Animation, Film, and Gaming

The draft version of the decentralized business support strategy for 2020-2023, if approved as such, will list the following priorities:

Table 6 Central Denmark Region Drivers for Growth and Development

Central Denmark Region Drivers for Growth and Development
• Food • Energy, Climate, and environmental tech • Digitisation and automation • Tourism / Business Tourism • Supporting: Healthcare Innovation, ICT, and Creative Industries

Revisiting Central Denmark Smart Specialisation Strategy from the Perspective of Aarhus

When developing the new strategy for 2020-2023 the Board's mission was to strengthen the productivity, competitiveness and internationalization of Danish businesses through an efficient, coherent, and local effort based on local needs, opportunities and challenges. Creating a simpler business support system has therefore been one the goals for updating the Smart Specialisation strategy as described previously. Digitisation and sustainability represent the two areas where Danish businesses can have a competitive advantage. Moreover, the businesses that can help achieve the United Nations Sustainability Goals will stand stronger. Therefore, efforts to support the Danish business in these two areas has also been a goal for updating the strategy.

Aarhus Municipality has together with the other municipalities in the Central Denmark Region provided a shared statement on the decentralized business support strategy for 2020-2023 in the public hearing. Amongst other comments the municipality's recommendation included a suggestion to a make clearer connection between the regional and the national priorities and to emphasize the role and strength of the Central Denmark Regions knowledge institutions in the ecosystem in the regional chapters of the strategy.

National growth areas that coincide and intersect with the local business support implementation concern innovation, green transition, digitalization and automation. These priorities, together with the necessary supporting competencies within these areas, form the new cluster landscape for economic transformation. In the coming years, alongside with these national priorities the city of Aarhus will have a specific focus on the intersection between tech and environment. Its role will be to employ means such as public procurement, support programs for start-ups, and – what it has always strived to do how as a local actor in developing new solutions – being an open, innovative collaboration partner for both R&D institutions and private businesses. As each year the City of Aarhus grows by approximately 5,000 new inhabitants, the aim is to deliver sustainable services to citizens, from an economic, social, and environmental perspective. In doing so, the city will locally lead the implementation of the chosen priorities based on the national business support strategy.

Strategy Process of Smart Specialisation in the Central Denmark Region

Since 2006 Denmark has followed the main principles for Smart Specialisation with a focus on bottom-up stakeholder involvement, and the existing regional development strategies have been treated as Smart Specialisation strategy equivalent.

The key actors behind the regional development strategies and regional growth until 2019 were six Regional Growth Fora and a National Growth Council. The Growth Fora consisted of regional political leaders, including mayors, trade unions, and employer organisations. They were typically headed by the regional political leader, who also sat in the national growth council. The Growth Council was based in the Ministry for Business and Growth. However, in 2017 – 2018 an expert committee set up by the Danish Government carried out an analysis of the business support system in Denmark. Based on the analysis the expert committee suggested a new model for a simpler and more coherent business support system. This also meant a change in the setup of the administration of EU structural funds. The Government then initiated political discussions

and reached a political agreement for the new business support system. The law demanding this change was passed in December 2018 and was put in effect January 1st, 2019.

After the reform of the business support system the previously described organisational setup for regional development and growth was replaced by a national unit called the Danish Executive Board for Business Development and Growth (The Board). The Board is served by a secretariat at the Danish Business Authority and is informed by six cross-municipal business centres. The new setup around business support system meant that from 2019 onwards the Danish Regions could no longer take part in business support related activities. The change also means that regions are no longer responsible for developing the regional growth and development strategies (Smart Specialisation strategies). Instead, the responsibility lies with the Board. However, as it has been concluded in the Nordregio report on the policy status of Smart Specialisation in the Nordics, it is apparent that in the Central Denmark Region 'the way in which the strategy process was carried out closely resembles the S3 EDP concept' (Wøien, Kristensen, & Teräs, 2019). While cluster organization has traditionally been strong, cross-cluster collaboration is likely to increase through the current emphasis on cross-cutting priorities, a process that will be useful in terms of a Smart Specialisation-like approach that includes the involvement of SMEs.

Stakeholder Involvement in the Central Denmark Region

To create the decentralized business support strategy for 2020-2030 the Board analysed the local and national business conditions and economics throughout 2019. This analysis formed part of the strategy work and has provided a strong data-driven foundation. Besides the data generated from the analysis work the Board has also engaged companies, municipalities, regions, business organizations, trade unions, science institutions, cluster organizations, innovation networks and other decentralized and governmental actors in the business support ecosystem to understand business demand, needs and challenges. More than 1,200 stakeholders have contributed to the strategy, which were involved through some of the engagement activities listed below:

- 7 public workshops across the country focusing on local and regional perspectives arranged in cooperation together with the cross-municipal business centres
- The Board also involved knowledge institutions in the strategy work to strengthen the understanding of the interaction between business, research and technology in Denmark
- 1 final conference targeting decision makers from the private and public sector
- To conclude the public hearing of the draft version of the strategy gives everyone a final say.

Aarhus Municipality's role in establishing the regional IoT & GovTech centre has been important to drive the vision, convey value propositions and help to gather the right stakeholders.

The example of the City of Aarhus demonstrates how the national government strategic priorities are implemented in a decentralised way.[14] The national business development strategy sets the course for business development in Denmark the coming years, and consequently the direction also influences the direction of the City of Aarhus. For the City of Aarhus an important task will be to bring the national positions of strength into play in the city and further develop the ones that are already present. For example, the local tech cluster, which plays a vital role in the Smart City development of the city of Aarhus, is going to be part of the national tech cluster. The overlapping national and regional drivers for growth in the new business development strategy represent funding and collaboration opportunities for the City of Aarhus, as the city strives to be a test and development partner for private businesses, e.g. through the Aarhus City Lab.

14 The national business support strategy is in fact defined as a decentralized strategy. https://erhvervsfremmebestyrelsen.dk/Erhvervsfremme-i-Danmark-2020-2023

Monitoring Mechanisms in the Central Denmark Region

In 2019, the key implementation mechanism consisted of the selection criteria for specific projects under the ERDF's Priority Axis 1 and 2. Until January 1st, 2019 the implementation mechanisms also included the regional growth partnership agreements that the Danish Regions signed with the government. According to the ERDF program specific efforts must be put in place to reflect the development needs identified in the smart Specialisation strategy, which in 2019 was the content of the intermediate decentralized business support strategy. For the 2020-2023 strategy period the implementation mechanisms will also include cluster efforts and designation of innovation networks to a greater extent. On the policy side, the government's growth teams and growth plans contribute to creating good framework conditions.

Until 2019 the monitoring and effect analysis was a shared task between the Danish Business Authority and the Regions. The Board is working together with the Danish Business Authority to find the best data-driven process for monitoring and effect analysis in the new setup.

Central Denmark Region Smart Specialisation Strategy Analysis

In this analysis the strategy story of Midtjylland is approached through the 5 angles of the Regional Strategy Diamond (Ch.1.2). A summary is then presented in form of the visualization in the Regional Strategy Diamond model. where the key successful actions and the identified bottlenecks (in red) are assigned to each dimension of the Regional Strategy Diamond.

Strategy Formulation - What we Say

Denmark set up a new business support system from 2019 onwards which removes from the Danish regions the responsibility for business support related activities. The change also means that the National Executive Board for Business Development and Growth and not the regions are in charge of developing the regional growth and development strategies, including the Smart Specialisation strategy. The new decentralized business support strategy is in public hearing process at the moment or writing and consists of two area: national cross-cutting priorities/drivers for growth and development and Central Denmark Region priorities.

Strategy Actions - What we Do

Developing the strategy 2020-2023 as a data-driven participatory process. More than 1200 stakeholders have contributed. Investments were done during the programming period 2014-2020 (ERDF and ESF) in boosting economic growth and increasing job creation by focusing on SMEs and improving workforce qualifications. The already strong research base is maintained by Aarhus research institutions, such as Aarhus University, Denmark's largest and second-oldest institute of higher education, with over 40,000 students and 11,000 staff (Aarhus University, 2018).

Strategic Competences - What we Have

Key achievements of the current Smart Specialisation priorities are visible through the effects of the ERDF and ESF as presented in the status report. To mention a few ERDF achievements: 73 innovative companies established, 350 new growth companies, 8000 new private full-time jobs, 7 energy efficiency and resource efficiency projects. In addition, ESF results are significant. Also, a good point of departure for the new programming period is the simplified business support systems. The knowledge base is strong, which is kept up by the educational and research institutions. In 2018 Aarhus was finalist in the Innovation Capital of Europe competition.

Strategic Competing - How we Win

By strengthening productivity, competitiveness and internationalization of businesses. This can succeed by utilizing an efficient, coherent and shared local effort that is based on local needs, opportunities and challenges. Focus on

digitalization and sustainability. Emphasis on connecting city, region, and national priorities.

Strategy Leadership - How we Lead

The Growth programme and strategy process and implementation is lead centrally in a de-centralized way in dialogue with local needs in order to make possible the specific efforts that reflect the development needs identified in the Smart Specialisation. Municipalities offer recommendations on a clearer connection between regional and national priorities. Efforts are put into community building and participatory processes.

Analysis Summary of Central Denmark Region

To summarize, the visualization of the Regional Strategy Diamond for the Central Denmark Region gathers the key successful actions and the identified bottlenecks (marked in red) which are assigned to each dimension of the Regional Strategy Diamond. In order to achieve economic transformation, the movement from and towards the angles, inwards and outwards needs to be in constant balance.

The city of Aarhus has played a core role in translating strategy into actions, also maintaining a steady pool of competences, as well as applying a leadership context that is inclusive and collaborative. The current challenge risking to unsettle the balance is the restructuring economic strategy processes as well as governance of business support and innovation. This can affect the dimensions of Actions and Competitiveness and move the balance. However, it is also an opportunity to revisit the current processes and utilize Smart Specialisation as a means of communication leading to a new way to complement the local/regional and national domains. The balance between the strategic dimensions, in order to be regained, will need to address the changed external context, yet focussing on internal sharing of responsibilities.

Strategy
- Innovation as a key priority
- The connection between regional and national priorities
- Cross-cutting priorities to support regional spearheads

Actions
- Innovation unit in the city office
- Smart City and sustainability actions related to strategy
- iCapital 2018 finalist

Competitiveness
- Aarhus University with international standing
- Digitalization & Competence of users
- Sustainability and focus on green issues
- Youth entrepreneurship

Competences
- University, knowledge institutions
- Digitisation, automation
- Competence of users
- Creative industries and cross-cutting competences

Culture and Leadership
- City and Region are tightly connected
- Participatory processes
- Community thinking
- Committed to collaboration

Figure 8 Strategy Diamond of the Central Denmark Region

3.5 ESTONIA, TALLINN – Smart Digital Capital

Estonia is a small state in the Baltic Sea region with a population of only 1.3 million. The population is largely concentrated to North Estonia. Approximately 44% of the country's population lives in the Harju county[15] that includes the city of Tallinn, Estonia's capital. As of January 2020, the population of Tallinn City was 443 932 residents which is 1/3 of the total population of Estonia. Tallinn together with the rest of the surrounding Harju county have a population of approximately 600 000 people. This has an impact on the Estonian economy with most of the businesses being concentrated in Tallinn and the Harju county. In 2017 53.1% of Estonian GDP was generated in Tallinn.[16] Tallinn occupies a good location as it is surrounded by some of the most important cities in the Baltic Sea region such as Helsinki, St. Petersburg, Stockholm and Riga which gives numerous business and cooperation possibilities.

During the ongoing funding period of 2014-2020 Estonia has experienced some convergence with the stronger regions in the EU with its GDP per capita PPP increasing from 75% of the EU average in 2013 to 81% in 2018.[17] The country has strong trade relations with Finland, Sweden, and Latvia. We can note Estonia's convergence with more successful countries in Europe and also an improvement of its position in the European Innovation Scoreboard. However, R&D funding in Estonia is still low with only 1.4% of GDP.[18] This can limit further growth of the Estonian economy.

Estonia is highly centralized with two levels of government: the state and local municipalities. Regional or county-level administration has no executive nor elective body. Municipalities in Estonia are mostly responsible for service delivery while the state is responsible for policy development and higher-level service delivery.

While the governance structure has benefitted the cities of Tallinn and Tartu and the lively technology related business and academic activities in these knowledge centres, there is some neglect in responding to other regional needs. This Smart Specialisation strategy story highlights the Tallinn strategy integration and concludes with some remarks on the challenges the country faces in building an equal base for growth overall in the country.

Regional Key Indicators for Estonia

Estonia occupies the RII ranking of Strong Innovator in 2019. The City of Tallinn is the key driving force as it is home to dynamically growing technology related business as well as academic activities. Tallinn is showcased below in the Smart Specialisation strategy section.

As a way of introducing the context of the Smart Specialisation strategy in Estonia we follow the European Innovation Index as presented in the European Innovation Scoreboard (EIS) 2019 over the measured period 2011-2018. Estonia is among the EU Member States that are included in RIS at the country level, as NUTS 1 and NUTS

15 Based on Statistics Estonia
16 Tallinn Statistical Atlas
17 Based on Eurostat
18 Based on Statistics Estonia

2 levels are identical to the country territory, and the measurements at the sub regional level are not available. The graphs below present the innovation index 2011-2018 (Figure 9) and the breakdown of the index in the dimensions and subdimensions of the European Innovation Scoreboard (Figure 10). The table lists the dimensions that constitute the innovation index in order of performance for 2018 with reference to 2011.

Estonia can boast a sharp increase in performance and has surpassed the EU average – the region ranks 103,8 out of the European baseline of 100 for EU-28 in 2018 – indicates an increase concentrated in the last measuring period. A general summary of the regional macro-economic indicators of Estonia is attached at the end of the Estonia/Tallinn strategy story. However, this constitutes an imbalance with regard to the region as most of the innovation activity takes place in Tallinn, the capital of the region, as well as in Tartu thanks to the influence of the University of Tartu. The overall outcomes are therefore not distributed and the areas outside the capital may appear to be more advanced than they are in reality. While the concentration around the capital allow fast developments there may be significant gaps between the major cities (Tallinn and Tartu) and the rural areas in other parts of the country.

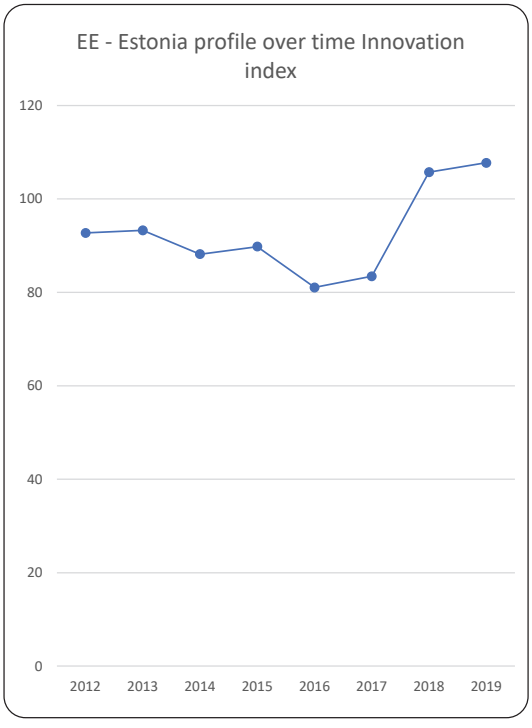


Figure 9 EIS of Estonia 2012-2019

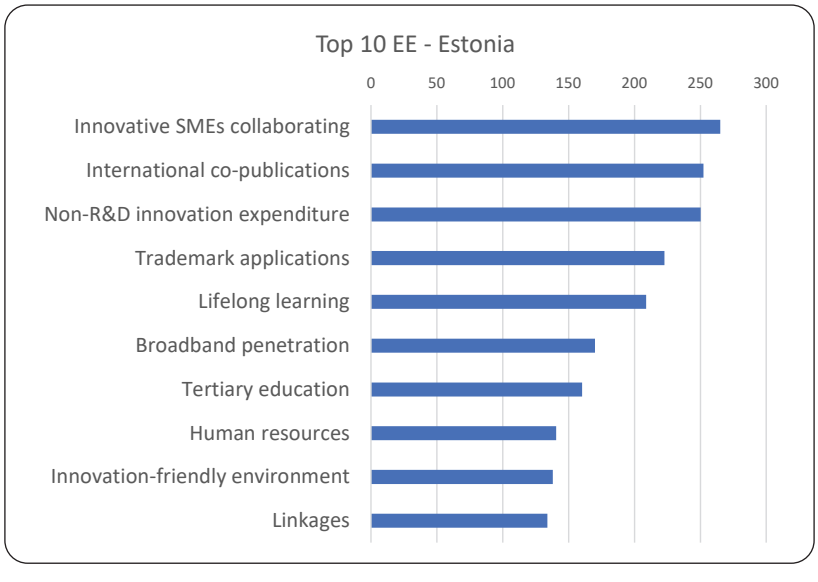


Figure 10 Estonia Profile According to EIS Indicators

According to the EIS performance measurement Estonia shows a distinct increase in innovation. However, it must be noted that this does not represent an even distribution in the country. The result is strongly linked with the developments in the city of Tallinn, Estonia's capital, and in the city of Tartu, another major university town. This development, therefore, can be understood to show the changes that have been taking place in the Tallinn capital area rather than Estonia as a whole.

The table to the left lists the EIS dimensions that constitute the innovation index for the country level. The dimensions may not all exactly match the criteria that RIS compiles for the RII, but the difference is more about granularity that about the quality of and impact on innovation performance. With this in mind it is safe to use the EIS and RIS dimension in parallel when comparing regional performance.

Two dimensions stand out: Innovative SMEs collaborating with others and Trademark applications, along with Non-R&D expenditures, and also International scientific publications. Another dimension that has had an effect in terms of significant growth is Broadband penetration. Employment impact and Sales impacts have experienced the least growth among the dimensions of the Estonian innovation index. Though the Employment in knowledge-intensive activities has grown to be apar with the EU-28 average, Employment in fast growing enterprises is lagging behind.

Out of these dimensions describing the innovation capacity of a region in EIS/RIS six criteria have been selected to be applied to all regions in this study as having significance for the Smart Specialisation strategy. The charts representing the six criteria illustrating in more detail the development of the region over the years since 2011 with regard to those specific dimensions are included in Chapter 4. The selected tables show the development in the following key innovation areas: Lifelong learning, Innovative SMEs collaborating with others, Public and Private R&D expenditures, SMEs innovating in-house, Non-R&D expenditures.

For Estonia the specific indexes in the chosen graphs show that a general sharp increase except in the criteria Expenditures in business R&D. Public expenditures in R&D have slightly started to rise. It is interesting that both the degree to which SMEs collaborate with each-other and Innovate in-house have risen. This suggests strong local competences and expertise, both on the business side and through the international academic output. The outcome seems to indicate that Estonia is steadily succeeding in building competitiveness and leveraging on the innovation potential of local businesses and their ability to collaborate.

Smart Specialisation Strategy in Estonia

Estonia provides an interesting example of the development and implementation of Smart Specialisation strategies as having been one of the major receivers of European Structural and Investment Funds since these funds first became available for the country.

Estonia does not have a separate Smart Specialisation strategy. The growth areas are integrated into two separate strategies: Knowledge-based Estonia: Estonian Research and Development and Innovation Strategy 2014-2020 under the Ministry of Education and Research and Estonian Entrepreneurship Growth Strategy 2014-2020 under the Ministry of Economic Affairs and Communications. Table 7 and Table 8 summarise the main targets of Estonian Research and Development and Innovation Strategy 2014-2020 and Estonian Entrepreneurship Growth Strategy 2014-2020 respectively. In addition, Tallinn developed its own Enterprise and Innovation Strategy for the 2014-2018 period emphasizing Service Economy, Future Technologies, and Horizontal ICT (see SHOWCASE TALLINN below). Smart Specialisation strategy in Estonia must be viewed from the national perspective as the country is considered as a single NUTS 2 level region and RIS3 processes have been led by the national government. However, because of different historic reasons, attention must be directed towards Tallinn City. Compared to other parts of the country it has by far benefitted the most from different RIS3-related funding sources.

While Estonia's Smart Specialisation strategy can be viewed from the national perspective, the national government-led strategies that comprise RIS3 do not focus on any particular region, or from

the perspective of the largest local municipality in Estonia – Tallinn City. Other parts of the country, such as the municipality of Tartu, have also financially benefitted, although to a lesser extent than Tallinn due to its function as the capital and economic centre of the country. In particular, this strategy story of Estonia brings out the main challenges of Smart Specialisation, including recommendations, from the city's perspective. As mentioned earlier administratively Estonia has a dual system representing national and municipal government, the regional dimension of Smart Specialisation is shared within this constellation.

Priority Areas and Spearheads for Estonia

The established growth areas for the Smart Specialisation strategy implementation in Estonia are:

1. Information and communication technology (ICT) horizontally through other sectors - use of ICT in industry (including automatization and robotics), cybersecurity, software development;
2. Health technologies and services - biotechnology, e-health (use of ICT for the development of medical services and products);
3. More effective use of resources - materials science and industry, innovative construction ("smart house"), health-supporting food, chemical industry (more effective use of oil share).

Table 7 Indicators Of The Estonian Research and Development ad Innovation Strategy 2014-2020

The overall aim of the development of RDI: To create favourable conditions for an increase in productivity and in the standard of living, for good-quality education and culture, and for the sustainable development of Estonia.
I. Investment in research and development: 3% of GDP, incl. private sector RD expenditures: 2% of GDP (2011: 2.41% and 1.52% of GDP, respectively)
II. 10th position (minimum) in the EU Innovation Union Scoreboard (2011: 14th position)
III. Labour productivity per person employed: 80% of the EU average (2011: 68%)
Sub-objective 1: Research in Estonia is of a high level and diverse
I. 11% of all top-level scientific publications in Estonia are among the top 10% most cited scientific publications worldwide (2008: 7.5%)
II. Number of new doctorate graduates in an academic year: 300 (2012: 190)
III. Number of top-level scientific publications per million population: 1600 (2012: 1191)
Sub-objective 2: Research and development (RD) functions in the interests of the Estonian society and economy
I. Government budget appropriations or outlays on RD (GBAORD) by socio-economic objectives other than GUF: 40% (2011: 30%)
II. Share of public sector research and development expenditures financed by the private sector: 7% (2011: 3.1%)
Sub-objective 3: RD makes the structure of the economy more knowledge-intensive
I. Employment in high-tech and medium high-tech manufacturing and in knowledge-intensive services (KIS) as % of total employment: 9% (2010: 6%)
II. Exports of high technology products as a share of total exports: 15% (2010: 10.4%).
Sub-objective 4: Estonia is active and visible in international RDI cooperation
I. The success rate of Estonia in the EU research and development framework programme Horizon 2020 is reflected in funding received per capita: 100% of the EU average (2011: 87% of the EU average)
II. Share of national public funding to transnationally coordinated research in total GBAORD is 3% (2010: 1.31%).

Table 8 Main Objectives, Sub-objectives and Related Indicators of the Estonian Entrepreneurship Growth Strategy 2014-2020

General objectives
To increase productivity per employed person to 80% of the EU average
To raise the employment rate in the age group 20–64 to 76%
Sub-objective 1: Estonians are entrepreneurial and enterprises are ambitious
I. The number of enterprises established three years ago with turnover exceeding 125,000 euros (as the three-year average; source: Business Register): initial level (2011) 1150, target level (2020) 1600
II. Number of enterprises with at least 20 employees (source: Statistics Estonia) initial level (in 2011) 3217, target level (in 2020) 4000
Sub-objective 2: Estonian companies manufacture efficiently high added-value products and offer innovative services.
I. The share of private sector expenditure on research and development in GDP (Source: Statistics Estonia): Initial level (2011) 1.52%, target level (2020) 2%
II. Sales of new to market and new to firm products or services (ratio to total return on sales; source: Statistics Estonia): Initial level (2010) 9.7%, target level (2020) 18%
III. The ratio of labour productivity per hour worked to the Eurozone average in current prices (Source: OECD) Initial level (2011) 51%, target level (2020) 65%
Sub-objective 3: Estonian companies are active exporters
I. The share of Estonia in world trade (source: WTO): Initial level (2011) 0.099%, target level (2020) 0.11%
II. Number of exporters (source: Statistics Estonia): Initial level (2012) 11.281, target level (2020) 15.700
III. Unit value index (UVI) (source: Eurostat): Initial level (2011) 130.6, target level (2020) the increase in the value is faster than the EU average
Sub-objective 4: Enterprises value Estonia highly for its business environment
I. Estonian ranking in the World Economic Forum (WEF) Global Competitiveness Report: Initial level (2012) 34th, target level (2020) 25th.
II. Estonian ranking in the Doing Business report:

SHOWCASE: Tallinn Smart Specialisation Strategy for Estonia

As RIS3 in Estonia is implemented by the central government with a national perspective, it is crucial to bring out the perspective of the largest local municipality in Estonia – Tallinn City which also functions as economic centre of the country. Although economic development is not the responsibility of local municipalities, we can consider Tallinn City to be an exception. The city has its own Enterprise Department with ca 60 employees. Tallinn also developed its own Enterprise and Innovation Strategy for 2014-2018 period. The strategy had three main objectives and it also chose the priority sectors for Tallinn City which were largely based on the national Smart Specialisation growth areas.

The priorities for Tallinn City according to the strategy were:

1. Service economy: creative economy, tourism, transport and logistics, health services, financial services;
2. Future technologies: health technologies, mechatronics, environmental technologies;
3. Information and communication technology horizontally.

If we look at the implementation side of the strategy, we can see that most of the activities found in the strategy were horizontal in nature and help to improve the general business environment such as consultancy and incubation services for enterprises, development of industrial parks, scholarships for students, promotion of the region and organising larger events (e.g. Tallinn Entrepreneurship Day). There were a couple of activities that support innovation more directly such as the development and implementation of smart city concept, innovation procurements and providing opportunities for testing new solutions.

Revisiting Estonia Smart Specialisation Strategy from the Perspective of the City of Tallinn

Synergies between the two sides of Smart Specialisation which are under different Ministries have been a major concern. Such fragmentation makes it also more complicated to revise the chosen Specialisations as the process of updating not only one, but two strategies is complicated as consensus has to be achieved between different stakeholders. Fortunately, for the next EU funding period Estonia will have a single research, development, innovation and entrepreneurship strategy which will last even till 2035. However, it is beneficial to map out the propositions for updating the strategies from the perspective of the City of Tallinn.

The main challenges from the Tallinn City side are related to the lack of cooperation from the state side and to funding. As was mentioned before, local municipalities were not included into the Smart Specialisation processes. It is understandable to some extent as before the local municipality reform in 2017 there were 213 municipalities in Estonia with an average population of 6349 inhabitants.[19] However, Tallinn is a special case for several reasons as its population is 1/3 of the total population of Estonia and it generates over half of the Estonian GDP. Because of its context, Tallinn City has enough scale to play a role in the Estonian RDI policy. Tallinn City could function as a testing platform for new technologies. The city has already shown its willingness through its now ended Enterprise and Innovation Strategy 2014-2018 and different innovation projects where the city has been one of the partners.

However, the participation in these projects has so far been hectic. Most of these projects are funded by the EU which means that the implementation of different ideas is not guaranteed because of the competition for funding. In addition, Tallinn City has so far participated in these projects mostly as a regular project partner and not as the lead partner. This means that the city itself has not acted as the initiator of different projects.

Fulfilling the role of a test platform would require several actions by Tallinn City and the state to improve different capacities and develop suitable funding mechanisms. The city has to improve its capacity to use innovation procurements as a tool to support the development of new solutions. So far it has been underutilized although there are also good examples from Tallinn such as the public transport ticketing system and 3D mapping solution for underground communications. The reasons are related to risk aversive culture and lack of knowledge about innovation procurements. Tallinn City together with other municipalities and the state could address this issue by organising a thorough training programme for officials who deal with procurements during their work. The public sector should also accept failures. At the same time, risks can be reduced if innovation procurements are used for small scale pilots of different solutions. In addition, changes in the procurement regulations might be necessary to encourage the use of innovation procurements.

Tallinn City also needs improvements in capacities related to project development and implementation. So far, the city has mostly been a project partner and not the lead partner in different EU projects. Although it means less administrative tasks, it also limits the city's capability to direct the development of new technologies that can be integrated into public services and urban environment. The potential topics could be related to smart city development and sustainable urban environment. As we can expect that during the first couple of years of the 2021-2027 funding period the local funding measures are still under development, it is crucial to have strong local stakeholders who could lead projects with EU funding such as Horizon or Interreg. Increased cooperation with local universities could increase the capacities related to project development and implementation. The city is already taking steps towards selecting the projects where to participate more thoroughly which will also help to concentrate its financial and human resources for projects with a higher priority.

19 After reform 79 municipalities with average population of 17 152 inhabitants. Ministry of Finance - https://haldusreform.fin.ee/2018/03/omavalitsuste-ulevaade-haldusreformi-jargselt/

A platform approach would also require local policy/financial measures that are developed in close cooperation between Tallinn, other larger municipalities, the state, academia and private sector which can directly support the development and implementation of new innovations. A good example here is the 6Aika initiative which is a network of six largest cities in Finland. The cities cooperate with each other, the state and regional councils to support the development and implementation of different smart city solutions. For companies it has given a possibility to test their solutions in a real-life setting. The projects are funded through different EU and local funds. Inclusion of local funds ensures that the execution of projects is not dependent on the availability of EU funding. At the same time, the EU funding can diminish the pressure on the local budget.

All the aforementioned proposals would help to support the entrepreneurial discovery process. First, they bring together stakeholders such as the city, the state, academia and private companies to develop financial measures and execute various projects. As the projects would focus on urban issues, the processes would mostly be coordinated by the city government and not the state. We could also expect closer cooperation with universities and private companies as the city is closer to them than the state.

Strategy Process of Smart Specialisation in Estonia

The processes related to Smart Specialisation (choosing growth areas, policymaking, policy implementation) was very centralized and has mostly been led by the Ministry of Education and Research (MER) and the Ministry of Economic Affairs and Communications (MEAC). The Smart Specialisation growth areas were chosen in two steps. First, a quantitative analysis based on NACE statistics was conducted to find economic activities that have a high concentration of employment, high added value and high export-intensity (Estonian Development Fund 2013; Karo et al. 2017). In a second step, the process was then given over to Estonian Development Fund to find areas with the greatest potential of collaboration between the local companies and research institutions.

Smart Specialisation strategy processes in Estonia have been led by the national government and have a national perspective. There are several reasons for this. The first one is related to the Cohesion Policy and how the EU classifies regions. Estonia is therefore considered as a single NUTS 2 level region in the EU. In addition, the country was eligible for the highest-level support from the European Structural and Investment Funds. The second reason is related to the developments in the Estonian regional governance. Till 1993 Estonia followed the Finnish model of single-tier self-governing subnational authorities with elected county councils (Sootla and Kattai 2018). However, since then Estonia has moved towards greater centralisation (Ibid.). Non-elected county governments which functioned as extensions of the central government at the county level were abolished with the local municipality reform in 2017 and their functions were divided between the central and local government level. In addition, local municipalities in Estonia are mostly responsible for the provision of public services and less for policymaking. Their exact responsibilities are brought out in the Estonian Local Government Organisation Act. In economic and RDI policy the local municipalities have no role and so far these policy areas have been under the responsibility of the central government. The process is exemplified in Figure 11 which illustrates the stakeholder engagement scheme in the next section.

Stakeholder Involvement in Estonia

The stakeholder involvement can be explained through a description of the driving actors in the strategy process. The Ministry of Economic Affairs and Communications and the Ministry of Education and Research delegated the task of choosing specialisations to Estonian Development Fund (EDF) which was a development agency accountable to the Estonian Parliament and which was organisation closed in 2016. First, a quantitative analysis was conducted to identify economic activities that were characterised by the highest added value, high export-intensity and high rate of employment (Estonian Development Fund, 2013). It was then followed by qualitative analysis

to identify the areas where local researchers and the private sector have the greatest potential to collaborate which was based on interviews with entrepreneurs, researchers, officials, and professional associations and one conference with participants from academia and the private sector (Ibid.). The Specialisations were then proposed by the EDF to the Ministries that included them into the aforementioned strategies. The extent to which collaboration with stakeholders is systematically organized is demonstrated in the Smart Strategy Process scheme in Figure 11.

Stakeholder involvement has largely been limited. It mostly happened during the development of the strategies. In addition, as the current funding period is finishing, the Ministry of Finance recently ordered a study to evaluate different EU funding mechanisms related to research, development and innovation. During the study, stakeholders were again involved. This shows that stakeholder involvement in Estonia is largely limited and occurs during the strategy creation and evaluation. The minimal stakeholder involvement may be explained with the small scale of the country. There are only two medium-sized universities (Tartu University and Tallinn University of Technology) with R&D capacity to cooperate with companies. Also, local government and the smart and sustainable city initiatives could provide opportunities for industry-academia-national government-local government cooperation. Therefore, the Tallinn perspective as presented above can serve as a reminder of the benefit in including local government collaboration in Smart Specialisation strategy processes from creation to implementation.

Monitoring Mechanisms in Estonia

In Estonia during the period of 2014-2020 no single Ministry or government unit has been assigned with the responsibility to oversee Smart Specialisation strategy implementation as a whole. This can be seen as problematic for monitoring as well as it makes it harder to build synergies between the two sides of the Smart Specialisation strategy which are under different Ministries. However, targets have been set for both strategies – the Estonian Research and Development and Innovation Strategy and the Estonian Entrepreneurship Growth Strategy. The main targets are presented in a summarized form above in Table 7 and Table 8. The respective Ministry under which the strategy is located is responsible for achieving the targets.

Concluding Remarks on Governance in Estonia

Estonia faces several challenges related to Smart Specialisation development and implementation. These challenges are related to how the governance system and RDI and economic policy have developed throughout the years. In the EU context Smart Specialisation is a policy tool for Cohesion Policy. As was already mentioned, it mostly targets NUTS 2 level regions. Because of its small size, Estonia is a single NUTS 2 level region which means that Smart Specialisation processes are led by the national government with a national perspective.

Several academic publications and reports analyse the development and implementation of Smart Specialisation strategy in Estonia (Karo et al., 2014; Karo and Kattel, 2015; Karo et al., 2017; Espenberg et al., 2018). All these publications not only give an overview of the overall development and implementation of Smart Specialisation but also highlight challenges that the country is facing. These challenges are related to the governance model of the country and how economic and RDI policies have been developed throughout the years.

The national-level governance has generally struggled with including social partners into Smart Specialisation-related activities, including the private sector. The task of proposing the growth areas was given to the Estonian Development Fund which had closer relations with Estonian start-ups, not the manufacturing industry (Karo et al. 2017). This in combination with the fact that the Smart Specialisation strategy processes were mostly coordinated by MER which has closer relations with academia has led to a situation where Smart Specialisation in Estonia is mostly focussing on the needs of the high-tech sector and academia (Karo and Kattel 2015; Karo et al. 2017). As the regional perspective was largely neglected and Smart Specialisation is mostly focussing on high-tech sectors, we can see that most of the RDI funding has ended up in Tartu and especially in Tallinn area.

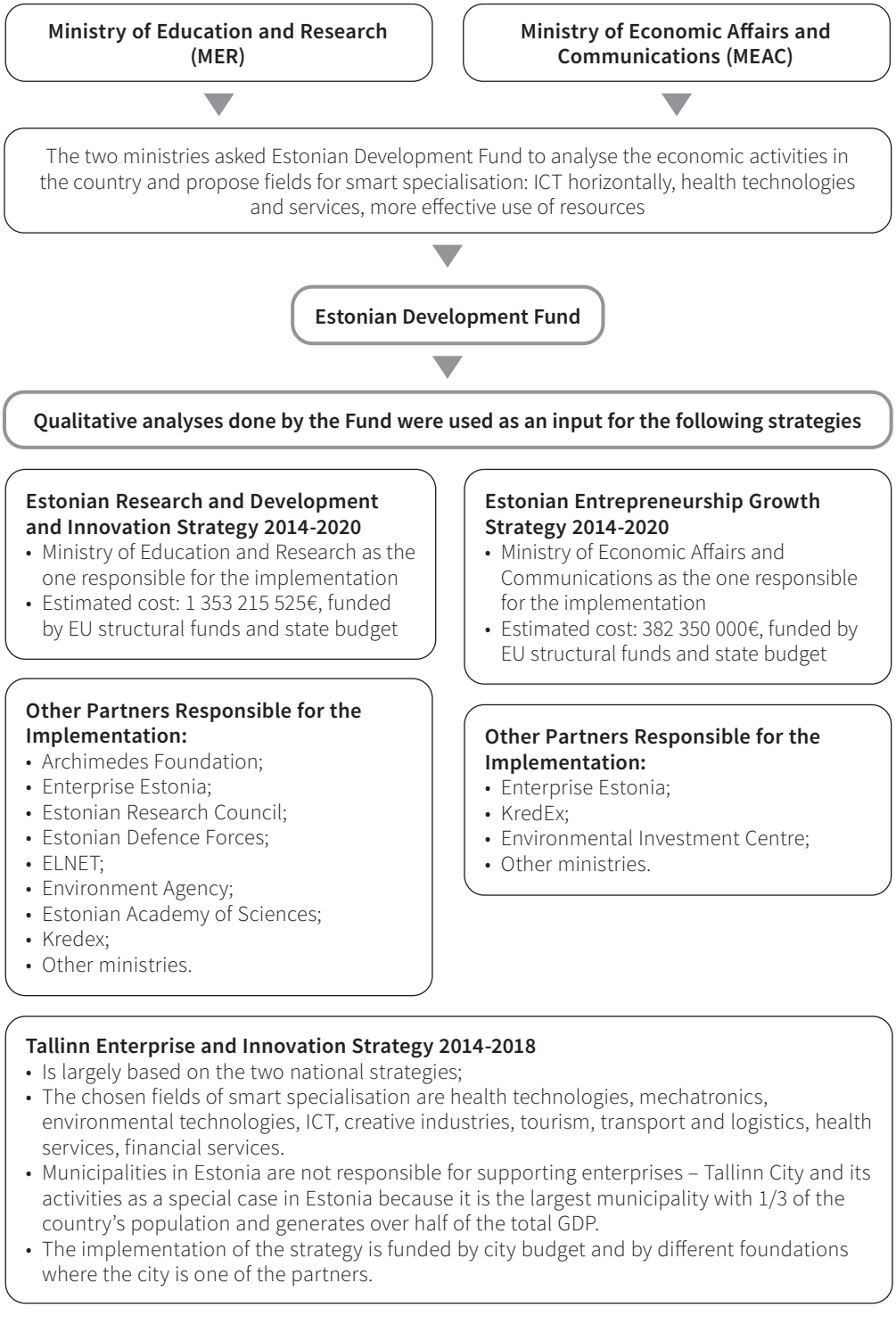


Figure 11 Partners and Stakeholders in the Estonian Smart Specialisation Strategy

Although the country is small both in terms of population and territory, there are significant socio-economic differences between the different counties related to deindustrialisation and decrease of the population outside of the major cities (Tallinn, Tartu). Local municipalities were left out from the selection of Smart Specialisation growth areas and the development of related policy measures. In addition, according to the Local Government Organisation Act, economic development is not the responsibility of local municipalities. In reality, we can see that because of the central implementation together with a national perspective only a couple of funding measures are specifically targeting counties (regional competence centres, county-level development centres). Such developments would require a policy response which would consider the needs of different counties in the country.

Estonia Smart Specialisation Strategy Analysis

In this analysis the strategy story of Estonia, in parallel with the strategy of its capital Tallinn, is approached through the 5 angles of the Regional Strategy Diamond (Ch.1.2).

Strategy Formulation - What we Say

Tallinn City Growth and Entrepreneurship Strategy is devised at the municipal level as a Tallinn city enterprise and innovation strategy. It could be understood as bundled together with the national RDI strategy to form a single Smart Specialisation strategy - a Smart Specialisation strategy package so to speak. Accordingly, the strategy includes:

1. Service economy: creative economy, tourism, transport and logistics, health services, financial services;
2. Future technologies: health technologies, mechatronics, environmental technologies;
3. Information and communication technology horizontally.

Thus, the Tallinn-driven strategy is integrated in Estonia's Growth Strategy at national level and has as its overall aim to create favourable conditions

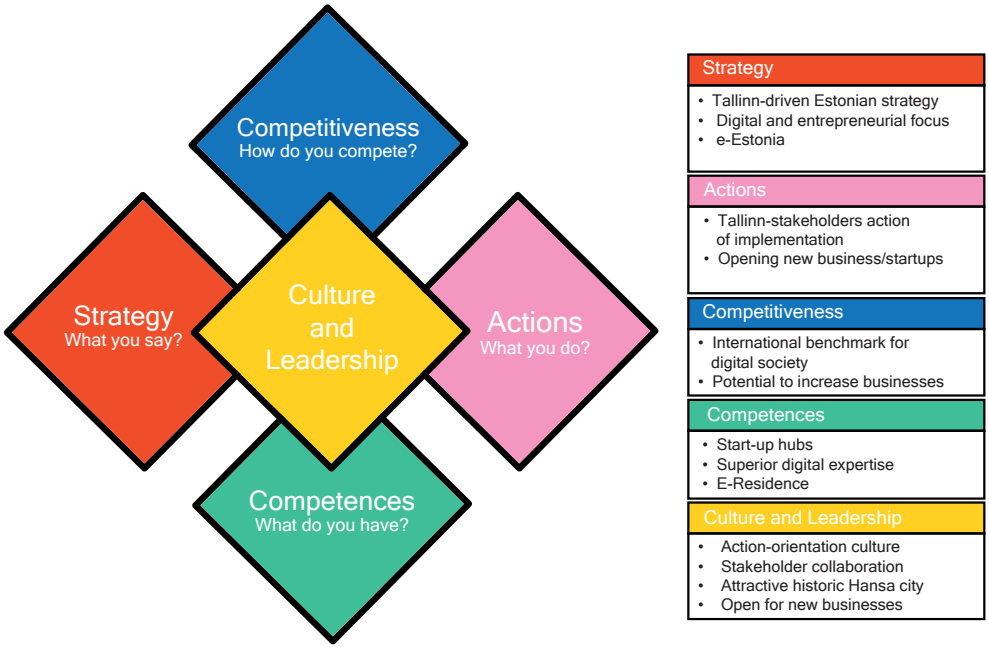


Figure 12 Strategy Diamond of Estonia

- for an increase in productivity and standard of living,
- for good-quality education and culture,
- for the sustainable development of Estonia.

The city and national strategies are connected and play out as Smart Specialisation strategy with a two-fold goal:

1. Knowledge-based Estonia (Estonian Research and Development and Innovation Strategy (2014-2020) under the Ministry of Education and Research)
2. Entrepreneurship Growth Strategy (under the Ministry of Economic Affairs and Communications, 2014-2020).

Strategy Actions - What we Do

A large-scale scheme as well as priority areas frameworks are established nationally for putting into action the two national growth strategies alongside the Tallinn entrepreneurship strategy. Responsibilities have been assigned and clear target setting is coupled with funding decisions. In practice, stakeholders located in the vibrant areas, such as Tallinn and Tartu, mostly take action and drive the of implementation and execution forward. The whole scheme is a clear roadmap for every stakeholder involved. Detailed targets in each priority area have been decided guided by two principles:

- Increasing productivity per employed person to 80% of the EU average
- Raising the employment rate in the age group 20-64 to 76%

Strategic Competences - What we Have

Technology competences both in academia and in tech-industry are well-rooted. To a major extent they define the knowledge centres in the capital city Tallinn, but also in the city of Tartu. This is a good socio-economic base for successful results of the strategic priorities in the Smart Specialisation framework. Digital competences are notably acknowledged, demonstrate by the high number of digital international start-ups, as well as through the government's e-residency initiative.

Strategic Competing - How we Win

Focus on the need of high-tech industry and knowledge institutions is a way to strengthen competitiveness. The high ambition of Estonia as a national enterprise is trickled down to secure entrepreneurial facilitation. While targeted funding and the efficient development of accelerating agencies geared towards enterprises and entrepreneurs in high tech may at some point need to be extended to include a wider base of entrepreneurship and a wider regional coverage.

Strategy Leadership - How we Lead

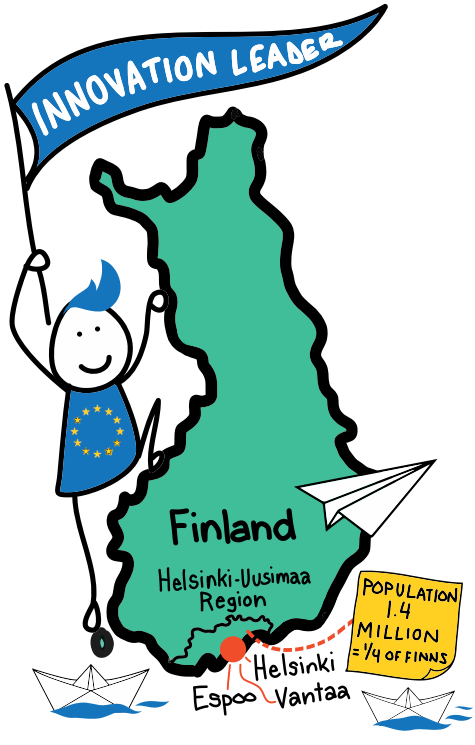
Estonia Smart Specialisation strategy is led at national government level. However, at the same time as most municipalities do not deal with innovation issues, some municipalities, such as Tallinn and Tartu, have shown interest in being included in the implementation and have become relevant contributors. An important aspect needed for success is to link and connect the actions of the different entities.

Analysis Summary of Estonia

To summarize, the visualization for Estonia gathers the key successful actions assigned to each dimension of the Regional Strategy Diamond.

In order to achieve economic transformation, the movement from and towards the angles, inwards and outwards, needs to be in constant balance. Based on the elements of the strategy story the strategy diamond appears to be in balance regarding the developments around the capital Tallinn and the university city Tartu. Also, with reference to the positive performance of Estonia in the Innovation Scoreboard the results indicate that economic development and innovation are in balance. In order to maintain balance between the dimensions Estonia can systematically follow how each dimension impacts the balance, for example making sure that competences are available, and that leadership is inclusive of diverse stakeholder levels also from areas outside the capital.

3.6 FINLAND, HELSINKI-UUSIMAA – EU Innovation Leader



In Finland, the Smart Specialisation strategies are made regionally. Each of the 18 regions have a Smart Specialisation strategy which is either linked to the regional programme or it is conceived as a separate strategy. The National Roadmap for Research, Development and Innovation (RDI) sets a common vision of increasing the intensity of RDI activities. The aim is of the roadmap is for Finland to remain at the forefront of both the production of new knowledge and the development and application of technology.[20]

All the 18 regions in Finland are members of the JRC Smart Specialisation Platform and many of them are also partners in different Smart Specialisation thematic platforms. The specialists working with Smart Specialisation in regional councils have organized themselves in order to meet regularly and this exchange of experiences and peer learning has proven to be very useful.

Located on the south coast of Finland Helsinki-Uusimaa Region is home to around 1.4 million people, which equals more than a quarter of the country's total population. The major cities in Helsinki-Uusimaa are Helsinki, Espoo, and Vantaa. The region works closely with its neighbour regions Kymenlaakso to the East, Päijät-Häme and Häme to the North, and Southwest Finland to the West. Across the Baltic Sea the co-operation with Estonia is significantly active.

Logistically the region is internationally well connected through several harbours and the Helsinki-Vantaa International Airport. Work is in progress for the Rail Baltica integration as a backbone of the future transport system in Baltic States using the main transport modes from the Helsinki-Uusimaa region to the nodal points Tallinn – Riga – Kaunas as a growth corridor.[21] Being the key to territorial integration of the Eastern BSR, the North Sea Baltic corridor through Helsinki links six European countries and six European capitals. Additionally, it provides links to Belarus and Russia and serves as gateway to the northern parts of Finland and Sweden.

Regional Key Indicators for Helsinki Uusimaa

The Helsinki-Uusimaa Region is in the group of top innovators in Europe as Innovation Leader (RIS, 2019.) With a score of 156 it is ranked as Leader + in the performance subgroups and occupies the 1st rank of all innovative Leader regions in EU-28 (3rd if Switzerland is included). Three municipalities (Helsinki, Espoo, Vantaa) in the Uusimaa region are the key driving forces and the strength in innovation is largely based on intense collaboration with the educational and research institutions present in the region.

20 https://minedu.fi/en/rdi-roadmap

21 A report is available at: www.uudenmaanliitto.fi/nsb_core/project_library

As a way of introducing the context of the Smart Specialisation strategy in the Helsinki-Uusimaa region we track the Regional Innovation Index (RII) as calculated in the Regional Innovation Scoreboard over the period 2011-2019. The two graphs below present the RII score development between 2011-2019 (Figure 13) and the breakdown of the RII as a regional profile based on the 17 measured dimensions (Figure 14). The table lists the dimensions that constitute the RII profile in order of performance for 2019 with reference to 2011. The represented area is Helsinki-Uusimaa, at NUTS 2 level. In Chapter 4, charts of six relevant categories are compiled for more detailed information on the performance in those specific areas. A general summary of the regional macro-economic indicators of Helsinki-Uusimaa is attached at the end of this strategy story.

The regional innovation index shows a sharp increase of innovation activity since 2017. This also corresponds to the general development in Finland as a whole as three other major regions also report an increase, though less marked than the capital region. Helsinki-Uusimaa has regularly occupied a top European ranking – the region has constantly scored above 150 out of the European baseline of 100 for EU-28 during the measuring period 2011-2019. However, in the last year of measuring the innovation performance shows a remarkable change: + 12,8 (relative to the 2011).

Figure 13 Helsinki-Uusimaa 2011-2019 RII

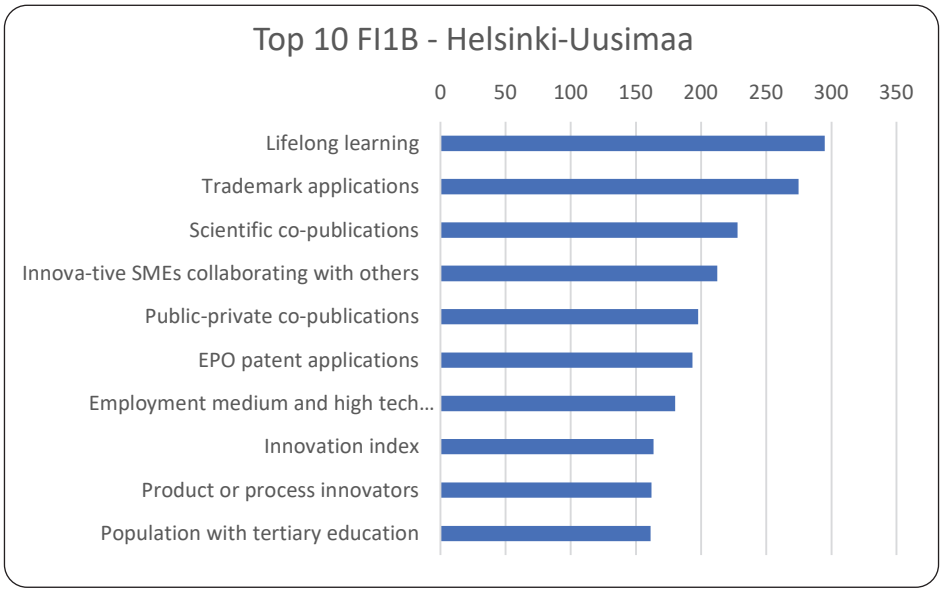


Figure 14 Helsinki-Uusimaa Profile According to the 17 RIS Indicators

Within the list of the 17 criteria for the Helsinki-Uusimaa region innovation index three stand as having gone through a dramatic change (Life-long learning, Trademark applications, Scientific co-publications). Of the three top performing dimensions Life-long learning show the biggest change with reference to 2011, and it has been steadily on the rise since 2011. The robust innovation areas of the region are related to the strong presence of education and science, which also influences trademark application. Other strong areas are collaboration and employment. These strengths reflect the ability to innovate through collaboration, a dimension that has been rising since 2015 (SMEs collaboration with others, Public-private co-publications) and the availability of securing employment of talents, especially in knowledge-intensive areas. While collaboration has been high on the agenda, also SMEs innovating in-house has kept on rising since 2015, though at a slower pace. R&D expenditures, both public and private have been declining since 2013. Also lower in the ranking are Marketing and Sales of new-to-market innovations. These are areas that need to be kept in mind in order to sustain the development. The lowest criteria stand out in the sense that Non-R&D expenditures have not been focussed on in the latest period since 2017, while they were still rising before that.

In Chapter 4, charts of six relevant categories are compiled: Lifelong learning, Innovative SMEs collaborating with others, Public and Private R&D expenditures, SMEs innovating in-house, Non-R&D expenditures. They illustrate the development of the region with regard to those specific dimensions over the years 2011, 2013, 2015, 2017, and 2019.

Smart Specialisation Strategy in the Helsinki-Uusimaa Region

The data compiled by the Helsinki-Uusimaa research and statistics team from the facts and figures of Statistics Finland shows that big companies in Helsinki-Uusimaa Region represent trade and manufacturing (G. Wholesale and retail trade, C. Manufacturing in the Standard Industrial Classification TOL 2008). The scientific and technology focussed companies often have less than 10 employees. R&D spending has begun to rise after a low point and is now at 3,5% of GDP (11.3.2020, source Statistics Finland). However, the current regional R&D spending is still behind the top year of 2011 with 4,2% of GDP. The latest figures of R&D in the region can be found from the data-bank pages of the Helsinki-Uusimaa Regional Council.[22]

The analysis of the strategies of the region's municipalities connected with the results of an examination of the regional competences led to the first Smart Specialisation strategy themes:

- Technological solutions and services,
- wellness technology services
- Cleantech.

At the end of 2014 a new and more extensive Smart Specialisation strategy was prepared together with the Aalto university. It provided a framework for working on concrete goals and projects through the co-operation of the actors in the region and had five main priorities and related priority portfolios. An important aspect was to keep the strategy human cantered and pay attention to education, know-how and skills. In different themes the goal has also been to foster experimenting and support piloting.

In the end of April 2020, the new revised Smart Specialisation strategy was approved with an emphasis on smart use of resources – environmental, ecological and social resources. Future growth will depend on the ability of the region to behave in a resource-wise manner, taking in consideration environmental and social needs while creating the conditions for economic development. The goals outlined in the regional Smart Specialisation strategy are:

22 https://www.uudenmaanliitto.fi/tietopalvelut/uusimaa-tietopankki/tutkimus_ja_kehitys (in Finnish only).

- Sustainable economic growth (by the wise use of resources)
- A Carbon Neutral Helsinki-Uusimaa (set in the Helsinki-Uusimaa Regional Programme 2.0)
- Opportunities for renewable industry (through technology and internationalization)
- Smooth everyday life and well-being (through human-centric services)

An important aspect of the latest strategy is the emphasis on collaboration. While the strategy will allow synergies between the funding instruments it will also create a wide framework for collaboration and joint development. This is secured by the Regional Council funding allocations for implementation of the regional development strategy in parallel with the Smart Specialisation strategy and reinforced by National funding (Business Finland and Academy of Finland) and European funding instruments.

Priority Areas and Spearheads for the Helsinki-Uusimaa Region

In order to achieve future growth in these areas and maintain the international competitiveness that the region has achieved so far by topping rankings in innovation, education, and happiness, the strategic work is in constant movement towards adjustments and improvements. Therefore, the new strategy is even more focussed on strong environmental solutions and robust collaboration. The strategic themes are made even clearer as the strategy is directed at providing well-defined goals for the regional areas of strength. Under the umbrella of resource wisdom, the new strategy unfolds into three themes:

- Climate neutrality
- Citizens' city
- Industrial modernisation.

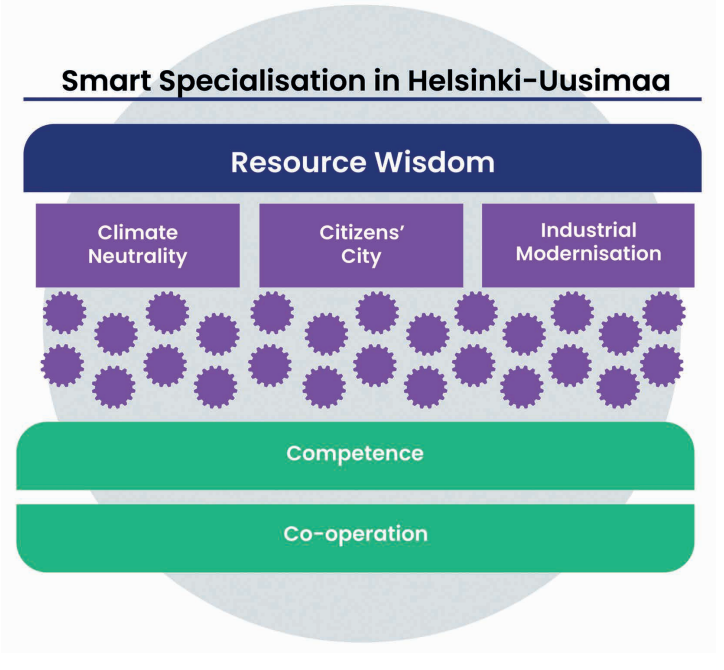


Figure 15 Updated Smart Specialisation Strategy 2020, Helsinki-Uusimaa

Crossing the three themes and supporting the work in each of them are two binding factors: competence and collaboration.

Competence is a uniting factor across all strategic priorities. Helsinki Uusimaa has a strong and versatile educational sector. Responding to the needs of the 'wise use of resources' as the guiding principle of the strategy requires the extensive and efficient utilisation of competences in all areas of priority.

Revisiting the Smart Specialisation strategy of the Helsinki-Uusimaa Region

Through the latest revision of the strategy in 2020 the Helsinki-Uusimaa region has redirected its focus in order to better serve the region's citizens and companies. For example, while the previous update has two aspects around citizens' needs, the new strategy combined the two themes, Smart Citizen and Welfare City into a single theme called Citizens' City. The current strategy summarizes the functions serving the citizens under the theme of 'city sustaining citizens' as a Citizens' City. This focus on citizens being able to rely on the urban environment they inhabit to sustain their needs of moving around of supporting their wellness, of rethinking housing possibilities has been done as an answer to experience and feedback received during the implementation phase.

Similarly, the aspects relating to carbon neutrality as a priority theme of the new strategy – circular economy, new energy, bio-economy innovations, new materials – will be combined with the other themes. Facets of each priority will in fact be able to drive innovation forward to serve several themes simultaneously. Collaboration is key in implementing the set goals.

The latest revision of the Helsinki-Uusimaa Smart Specialisation strategy was officially approved by the Regional Board in Spring 2020. In addition to the strategy paper, there is a need for more detailed description of the priorities and the plans for implementation. These together with other supporting materials will be the result of the strategy update work in 2020. An English translation has been provided and the Helsinki Smart brand is to be updated to reflect the new strategy.

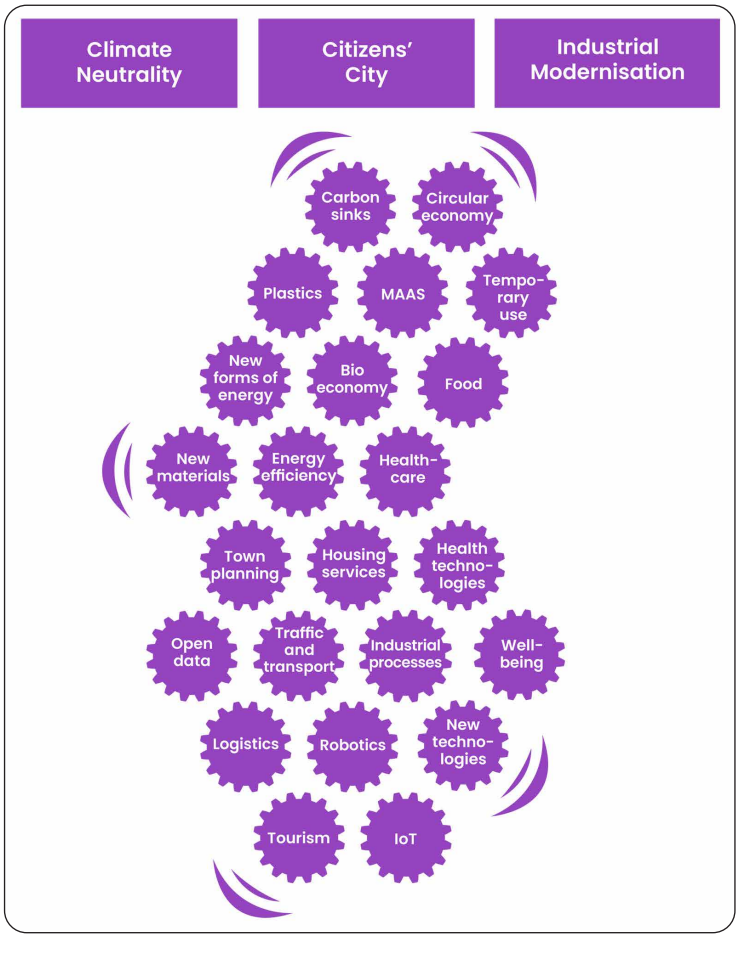


Figure 16 Interconnected Facets of the Smart Specialisation Strategy Priorities 2020, Helsinki-Uusimaa

Some of the elements leading to the update of the Smart Specialisation strategy of the Helsinki-Uusimaa Region are considered below.

Strategy Update Through Evaluation: Before the new financing period it was necessary to look at the Smart Specialisation strategy and its implementation in more detail. Though we had already made some strategy updates during the implementation, we wanted to know if there was a need for bigger changes. To guide this work, we used the steps of the RIS3 Assessment Wheel.

The work for a new Smart Specialisation strategy of Helsinki-Uusimaa Region started with a SWOT workshop of our Regional Management Committee (MYR). Participants of the workshop evaluated the region against five different future scenarios. One key finding from the workshop was the importance of education in the region. It is a strength and a possibility for the region, and it needs to be invested in.

Also, the learnings and experiences of the RIS3 implementation were subject to investigation. The main findings were that the Smart Specialisation strategy has succeeded in connecting actors and building up networks. The projects implementing the strategy have been successful in multidisciplinary cooperation, which is important for creating new qualitative innovations. On the other hand, we could have done more on international cooperation. Our projects for Smart Specialisation should have had a stronger international dimension. The results of the analyses have been published in a report (in Finnish only).[23] To get better understanding of the potential international dimension our Helsinki-Uusimaa office in Brussels compiled a report of recent from the EU point of view and mapped out future developments.

Benchmarking the Big Five: To benchmark our region internationally we made a "Big Five, Analysis of the Regional Research and Innovation Strategy for the Helsinki-Uusimaa Region and its Cooperation with the Peer Regions".[24] This report compared the Helsinki-Uusimaa region with other four regions on the innovation policies and the performance of the regions in specific indicators and sectors. It suggested that Helsinki-Uusimaa region should put efforts on connecting the regional Specialisation and sectors with the global market and supply chain.

EU Strategies: During the process of preparing our new Smart Specialisation strategy sustainable development has become more and more important. One of the aims of the EU is sustainable growth, and the Green Deal sets important goals to our regional strategy as well.

Sustainable Development Goals: From the UN SDGs we have chosen six goals that are most important for the strategic priorities at Helsinki-Uusimaa region considering environmental, social, and economic sustainability at the present moment. These are: nr. 1 No poverty, nr. 4 Quality education, nr. 9 Industry, innovation and infrastructure, nr. 11 Sustainable cities and communities, nr. 13 Climate action, and nr. 16 Peace, justice and strong institutions.

Wise Use of Resources: All the analyses, EU-strategies, and national programmes referenced earlier, together with the OECD sustainable development goals and Green Deal lead the Helsinki-Uusimaa region to emphasize wise use of resources – economical, environmental and social. Under the umbrella of 'resource wisdom' three priorities are chosen: one supporting the goal of carbon neutrality, one supporting urban development, smooth everyday life and wellbeing, and one supporting industrial modernisation. Important elements in all three priorities of wise resource use are competences, skills, and education.

Interfaces and Collaboration: One of the learnings when implementing the previous strategy was that developing new strategic approaches seldom fits a single theme. On the contrary, new openings and innovations arise from the interfaces. There needs to be room for new combinations and new technologies. Even while focussing on specific themes, we need to refrain from narrow assumptions on how the markets or technologies will develop. That is why the new strategy is not built on silos representing new strategic priorities, but it takes great effort to enable cross-sectional co-operation and cross-sectional projects.

23 https://www.uudenmaanliitto.fi/files/23715/Uudenmaan_alykkaan_erikoistumisen_strategian_arviointi.pdf (Finnish)

24 https://www.uudenmaanliitto.fi/files/24776/Big_five_Partnership.pdf (English)

Figure 17 Interconnected Facets of the Smart Specialisation Strategy Priorities 2020, Helsinki-Uusimaa

Strategy Process of Smart Specialisation in the Helsinki-Uusimaa Region

Helsinki-Uusimaa joined the JRC S3 Platform in 2012 and began to prepare its first Smart Specialisation strategy. To get a better picture of the innovation environment of Helsinki-Uusimaa we collected relevant information described earlier. In addition, the Helsinki-Uusimaa office in Brussels compiled a report of recent from the EU point of view and mapped out future developments.

The work for the Smart Specialisation strategy has been a process that complements the Helsinki-Uusimaa Regional Programme and develops and extends the activities taking place in the region. It is being carried out in phases starting from the goal setting for the region's development goals, the planning and implementation of projects, and the revising and updating process that is still ongoing. In this process, the region's challenges, development goals and necessary actions have been discussed combining the viewpoints of various actors and work done in different areas, covering different governance structures and key drivers. In addition, to scan the regional innovation potential we had several studies made that were then analysed. The whole process was facts based.

In the decision-making process by the regional bodies the representatives of research institutes are very active. In the Regional Management Committee, we have members from the universities and research organisations. It is a statutory body appointed by the Regional Government. The Committee approves the implementation plan for the regional program, which includes the most urgent projects in the province and an agreement on their financing. It directs the content and implementation of the regional smart specialisation strategy and makes decisions of the regional ERDF funding. The representatives of science institutions bring their latest scientific knowledge to this local policy making. ERDF financing has been and will be the most important instrument in the Smart Specialisation strategy creation and implementation.

Stakeholder Involvement in the Helsinki-Uusimaa Region

To discuss and shape the potential and expectations of the region with regard to Smart Specialisation we organized regional workshops. As background we used the results of regional analyses. The participants came from a wide range of organisations and in the workshop we all were asked to identify the possible priorities of the region together, keeping in mind the global megatrends. Participants also discussed the operational models for implementing the strategy.

The region has supported the implementation of the Smart Specialisation strategy by promoting and financing co-operation between different regional actors by using regional funding. The results have been good in areas such as the health sector, technology industries, and smart citizen themes. In the cleantech theme a key player has been the Smart & Clean foundation by bringing together cities, businesses, researchers and financing for joint developing.

Innovation platforms and development environments play a key role joining the regional innovation ecosystems to create and implement the Smart Specialisation strategy. The innovation platforms offer a possibility for piloting or demonstration of new technologies and innovations. In recent years we have supported actions in the spearhead themes by Regional innovations and experimentations (AIKO) -financing. These have been more specific projects to experiment new solutions for financing projects and co-operation.

Figure 18 'Team Play' for Smart Specialisation, Helsinki-Uusimaa

The revised strategy emphasizes collaboration and knowledge sharing as crucial to allow each participating organisation, entity and innovation actor to benefit and contribute to the economic growth of the region within the resource-wise approach to development. The 'team play' approach permits all actors to move forward while relying on each other's collaboration.

Movement in the 'team play' starts with the Smart Specialisation strategy which is approved by the Board of the Helsinki-Uusimaa Regional Council. The implementation and direction of the strategy is overseen by the Regional Management Committee (MYR), which is unofficially called the and is a statutory authority that manages regional resources and defines the state administration's regional development projects and policies. The group includes representatives of Helsinki-Uusimaa Regional Council's member municipalities, state administration, institutions of higher education, labour market organisations, and industry associations among others. The Secretariat of the Regional Management Committee (MYRS) oversees and reconciles regional projects and prepares matters for the Regional Cooperation Committee.

The practical implementation of the Smart Specialisation strategy is coordinated by the Helsinki-Uusimaa Regional Council's Smart Specialisation team. The team compiles a summary based on data collected through monitoring and reports on the strategy's implementation to the Regional Cooperation Committee and the Board of the Helsinki-Uusimaa Regional Council.

Different teams of the Helsinki-Uusimaa Regional Council and the Helsinki EU Office also participate in the implementation of the project. In order to maintain a shared vision and up-to-date picture of the situation, the strategy and its implementation is discussed in a coaching team as well as expert groups in the Helsinki-Uusimaa region. The coaching team is a new cooperative team created as part of the implementation of this strategy. It comprises of research, development and innovation experts who represent companies, research facilities and educational institutions. The coaching team helps to steer the Smart Specialisation in our region.

In addition, the Regional Council coordinates expert groups of different fields. The members of the groups are primarily representatives of the municipalities. The strategy is mainly overseen by the group of municipal development managers and other groups depending on the themes. They discuss the Council's preparatory work in advance and integrate it with the work performed in the municipalities in order to improve its efficiency. The groups share information about important current affairs and oversee the region's interest, issuing statements or initiatives when necessary. The Smart Spe-

cialisation strategy is a new topic discussed within the expert groups.

Monitoring Mechanisms of the Helsinki-Uusimaa Region

The Regional Cooperation Committee (MYR) as described above regularly monitors and evaluates the implementation of the Smart Specialisation strategy. It guides the implementation and proposes changes to it and the strategy itself if necessary.

Monitoring is done at several levels. To help us with building up a good monitoring system we participated the JRC PXL session of monitoring in the Smart-up BSR Aarhus innovation camp. One of the learnings was that monitoring doesn't necessarily mean numbers. One of the recommendations for us was to use storytelling as well. For the monitoring of our strategy we will use our previous experience and PXL learnings together with the latest knowledge form the S3 platform.

The plans for monitoring the coming new strategy include following and publishing the statistics of regional development in our Finnish website[25] e.g. figures about R&D, company profiles, education. At the level of project financing we plan to follow the amount of funding we provide and evaluate the outcomes of the financed projects. Concrete cases of our Smart Specialisation implementation will be presented under the HelsinkiSmart brand.

The monitoring mechanisms are currently being organised according to the new strategy implementation as a 'team play' as described in the Stakeholder Involvement section.

Helsinki-Uusimaa Smart Specialisation Strategy Analysis

In this analysis the strategy story of the Helsinki-Uusimaa region is approached through the 5 angles of the Regional Strategy Diamond (Ch.1.2). A summary is then presented in form of a visualization of the Regional Strategy Diamond model, where the key successful actions and the identified bottlenecks (in red) are assigned to each dimension.

Strategy Formulation - What we Say

The goal of the Helsinki-Uusimaa Region's Smart Specialisation strategy is to promote sustainable growth via value creation for citizens/consumers and for businesses as part of renewable industries. The aim of the Smart Specialisation strategy is to advance from a 'resource-wise' perspective towards tomorrow's solutions for a sustainable future. Resource wisdom is practiced in three domains: carbon neutrality, citizens' cities, renewable industry and services.

The core issue of the strategy is to maintain the conditions for a leading position in response to the changes in the market with consideration of social, economic, and environmental responsibilities.

With these two major end goals in mind the Helsinki-Uusimaa region will maintain regional competitiveness:

- as an international innovation cluster and forerunner in the production and use of innovative products and services,
- by doubling the regional impact of research and innovation work during the next period.

The new strategy aims at creating a framework for a resource wise approach to Smart Specialisation and economic transformation. The resource wise Smart Specialisation strategy unfolds into three themes:

- Climate neutrality
- Citizens' city
- Industrial Modernisation.

Supporting the work in each of the thematic focus are two cross-reaching factors: competence and collaboration.

25 https://www.uudenmaanliitto.fi/tietopalvelut/uusimaa-tietopankki

Strategy Actions - What we Do

An essential part of future solutions will be created by research and innovation activities if public-private collaboration is actively put into practice (Actions). Having reached the highest level of availability of top expertise requires firm actions from the educational and research organisations for securing the competence of the future. However, competences and collaboration are emphasised as key success factors through agreed practical actions among all stakeholders, not solely among public sector entities. The region needs indeed to face the challenge the develop spot-on competences in collaboration with firms to meet the demand in a changing market and economy, otherwise this can potentially become a bottleneck.

In practice, the Smart Specialisation strategy is implemented in the form of three main priorities and related priority portfolios, however with regard to value creation there is the risk of a bottleneck in enrolling firms and industry. The priorities are multi-disciplinary thematic entities with strong innovation and value creation potential, and implementation depends on private sector collaboration, firms with firms, and public sector with firms. To this end, throughout the RIS3 period, a continuous discussion needs to accompany cooperation with universities, universities of applied sciences, research institutes, companies and municipalities. Communication on the importance of collaboration has been a strength of the public sector actors, however collaboration in action needs constant examination, updating, and input to be able to enrol firms and enable value creation. Collaboration as a principle goal is highly dependent on dialogue with industry stakeholders in order to agree on actions that lead to value creation. A future that is based on resource-wise value creation is indeed possible if the public-sector-research (university) link works in practice.

Activities involving strong regional actors are organized on thematic innovation platforms. The use of these platforms upholds and accelerates coordination of change processes, management of project activities that initiate and carry through progress, as well as active collaboration between, and within, organisations as key actors with their network of stakeholders. The Helsinki-Uusimaa Regional Programme's implementation plan is a rolling tool that is continuously renewed, and both the Regional Programme and the Smart Specialisation strategy are supported by an interlocked funding scheme of regional, national, and EU instruments.

Strategic Competences - What we Have

Competences and collaboration between competences are key success factors. The regional concentration is one of the highest in Europe, second only after Berlin. This is the result of intensive efforts in developing a link between public sector, business, and universities as well as strengthening internationalisation of the pool of competences into the region. Maintaining and surpassing this level is the future challenge.

Competitive research funding instruments are focused, yet they must be increased. The region has a widely functioning research infrastructure ecosystem, which includes the major national research infrastructures, Finnish actors' partnerships in European infrastructure projects (ESFRI), and memberships in other international research infrastructures, as well as the local research infrastructures of the research institutes. It is important to ensure that the right competences are in constantly created to put the new strategic goals into action in such a way that business and industry are linked with public sector goals while going forward and creating value. Lack of an appropriate supply of competences can easily become a bottleneck.

Strategic Competing - How we Win

A key element of winning in the Helsinki-Uusimaa Smart Specialisation strategy is to allow openness and push for making collaboration happen. The industry's view is that the current collaborative practices are not sufficient to deliver innovations on the scale that would be required for the region to maintain its position and its international competitiveness, let alone keep up the pace of change and grow. Both the public and the private

sector have identified that competing is possible on a resource-wise model, however, how ways to collaborate on this need to be developed. To respond to these needs, in the RIS3 period support is directed at projects and services that apply the actor-oriented, facilitated open development environment operation model. While an open and facilitated collaboration within the regional ecosystem is being developed in order to carry out the RIS3 spearhead projects, public and private action are not yet bridged. For the successful realization of the RIS3 goals (scale, participation, growth, impact) it is extremely important to develop and open and common operating model that gives different actors a chance to develop their own innovation platforms and ecosystems utilizing the help of a predictable and engaged support system.

According to the Helsinki-Uusimaa Smart Specialisation strategy before revision the open development environment operating model acknowledged the RIS3 priorities while remaining in line with the Finnish research infrastructure strategy and roadmap. The new strategy has lifted up the environmental and social aspects of economic transformation by emphasising resource wise actions. As a winning formula the resource wise approach acknowledges collaboration, yet efforts are still needed to build a link between the public sector and firms. Individual development platforms realize this general open collaborative model and its principles based on each organization and their networks. The alignment between public and private sectors would increase the efficacy of the platforms. Regardless of the type of activity, familiarity with the common operating culture and processes and the easiness of applying them in each actor's own environment are central to the success of the RIS3 process and the regions continued success.

Strategy Leadership - How we Lead

The funding instruments that lead the process have been revised and adjusted in accordance to the strategic priorities' goals. A continuous adjustment of the funding instruments and the measures taken for the rethinking of the research ecosystem is emphasised. The aim of leading the process is to ensure that it can function effectively through improving openness, long-term planning, and assessment for better controlling the implementation of the roadmap and the strategy updates. However, efforts in linking public and private sectors still remain unsatisfactory, the way to lead could be improved through e.g. collaborative target setting.

Analysis Summary for Helsinki-Uusimaa

The aim of the Helsinki-Uusimaa Smart Specialisation strategy is for the region and its major cities, including the capital, to advance towards tomorrow's solutions and a better future for its inhabitants and its companies. An essential part of future solutions will be created by research and innovation activities if public-private collaboration is actively practiced.

The centre of the strategy diamond plays a pivotal role in maintaining the balance and possible movement in the other dimensions. The Leadership, culture and context dimension has as its main function is to provide a fruitful place for collaborative target setting between public sector and industry, as well as universities. A constant link between the two sectors needs to be first put to work and then be maintained with agility. However, the balance can also be initiated from any of the other angles.

In addition to the leadership angle, solving the bottlenecks in the dimensions of competitiveness, actions, and competences will keep up the balance. There are some boundaries to overcome between the strategy formulation and the current bottlenecks in the able of actions, in the powerhouse of competences, and in the competitiveness. The key concepts to achieve successful balance are collaboration, functioning links and enrolment within sectors actively involved in innovation and between industry and public sector. This can be achieved through restructuring, but it can also be obtained through productive informal links. Smart Specialisation strategy and implementation has recently resulted in such an informal network of regions which can contribute towards a balanced regional strategy diamond.

Strategy

- "Resource wisdom" with solutions
- Citizens, Carbon neutrality and Renewable industry focus
- UN SDGs integrated to RIS3
- Public and private sector close collaboration

Actions

- Thematic platforms to coordinate actions and projects
- Public and private sector work together
- Commitment to be forerunner in carbon neutrality

Competitiveness

- EU Innovation Leader
- International high-quality knowledge-intensive society
- Best practices of innovation ecosystems

Competences

- One of the highest EU concentrations of PhD and knowledge-based start-ups and scientists
- Research in strategic priorities
- Creativity and innovation
- Digital and sustainable

Culture and Leadership

- Proven public and private collaboration culture
- Multi-level governance and trust
- Startup-culture attracts international youth and businesses

Figure 19 Strategy Diamond of the Helsinki-Uusimaa Region

3.7 FINLAND, Kotka / Kymenlaakso – Beyond Kotka Port

Kymenlaakso borders the regions of Uusimaa to the West and Russia (Leningrad Oblast) to the East. The region has approximately 180 000 inhabitants. Kotka is the second largest city with a population of 52.000 people, and it is located on the coast of the Baltic Sea at the delta of River Kymijoki. Kouvola, the largest city (83.000 inhabitants) is further inland, and Hamina to the South is Finland's oldest garrison town. One special feature of the region is that Vaalimaa is the most Eastern and primary border crossing point between the European Union and Russia. Kymenlaakso is an international hub for logistics and related business and knowhow in the Baltic Sea region, and it is home to one of the most significant forest industry clusters in Europe. The region is also famous for beautiful nature e.g. national parks located in the outer archipelago, marshland, forest and lakes. This year three parks in Kotka were awarded the Green Flag Award, Kotka National City Park was awarded with honourable mention in the Council of Europe Landscape Award Competition.

In July 2019 in Nordregio's policy brief Kymenlaakso was considered an early adopter and its Smart Specialisation strategy process was evaluated positively: "Since adopting S3, stakeholders in Kymenlaakso have been able to discern their key regional strengths and have concertedly created a clear regional vision".

Stakeholders participating in the collective identification of needs and potential for Kymenlaakso´s innovation ecosystem applied a multi-step process. By revisiting the existing Smart Specialisation Analysis and conducting a RIS3 related SWOT analysis a synthesis was elaborated in June 2018. This has helped to predict future scenarios and pinpoint specific development needs. These exercises have shown regional strengths and opportunities and most importantly weaknesses and threats in need of specific attention towards building of new competence and collaboration.

Regional Key Indicators for the Kymenlaakso Region

Kymenlaakso is the most Eastern territory of Southern Finland (Etelä-Suomi) region and has a subregion (NUTS 3) status. The Regional Innovation Scoreboard does not provide figures for the subregion, but for the larger area of Southern Finland (NUTS 2, FI1C,) to which the Kymenlaakso region belongs. Therefore, the regional economic outputs of Kymenlaakso is presented below at NUTS 2 level referring to a much larger territory, however excluding the capital region and Uusimaa which are separate at NUTS 2 level. This gives a general description of the wider Southern Finland area which incorporates several university cities, while the Kymenlaakso Region (NUTS3: FI1C4) only represents about 10-15% of the population and even less of the regional GDP of the Southern Finland area.

The Kymenlaakso region as part of Southern Finland is in the group of top innovators in Europe as Leader (RIS, 2019). With a score of 120,8 it is ranked as Leader - in the performance subgroups and occupies the 36th rank of all innovative Leader regions in EU-28.

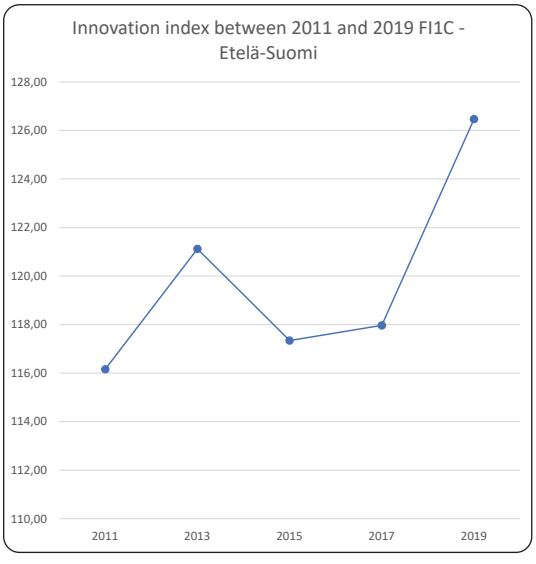


Figure 20 RII of South-Finland 2011-2019

The region has seen an increase in performance of 10,3 with reference to 2011.

As a way of introducing the context of the Smart Specialisation strategy in the Helsinki-Uusimaa region we track the Regional Innovation Index (RII) as calculated in the Regional Innovation Scoreboard over the period 2011-2019. The two graphs below present the RII score development between 2011-2019 (Figure 20) and the breakdown of the RII as a regional profile based on the 17 measured dimensions (Figure 21). The table lists the dimensions that constitute the RII profile in order of performance for 2019 with reference to 2011.

As seen in the figure to the left, the regional innovation index shows an increase of innovation activity in the last three years for the larger territory of South-Finland which comprises the region of Kymenlaakso, keeping in mind that Kymenlaakso covers only a third of the Southern Finland territory and has less educational institutions than the other parts. The increase corresponds to the general development in Finland as a whole, where performance has increase in four regions.

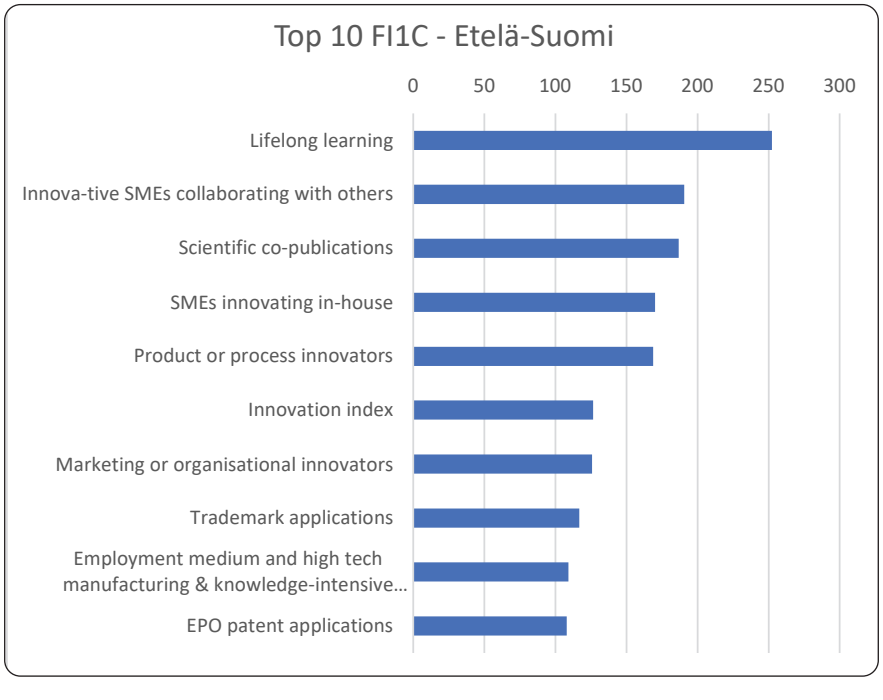


Figure 21 South-Finland Profile According to the 17 RIS Indicators

The specific dimensions indicate that R&D expenditures, both private and public, occupy the lower end and could be increased. There is a considerable number of dimensions that have not improved since the 2011 reference. Kymenlaakso is aware that there are clear areas of improvement in the area of R&D expenditures, but not only, in order to achieve the goals, set for the selected priorities of the RIS3 strategy.

In Chapter 4, charts of six relevant categories are compiled for more detailed information on the performance in those specific areas. The tables show the development in the key innovation areas: Lifelong learning, Innovative SMEs collaborating with others, Public and Private R&D expenditures, SMEs innovating in-house, Non-R&D expenditures. The results show a steady decline in R&D expenditures, while four of six represented indicators mark an increase. A general summary of the regional macro-economic indicators of Kymenlaakso is attached at the end of this strategy story.

Smart Specialisation Strategy in the Kymenlaakso Region

With Smart Specialisation strategy Kymenlaakso is aiming at a systematic development of competitive and attractive innovation ecosystem, increased investments in research, development and innovation activities and generation of smart, sustainable and inclusive growth. The region´s resources are being concentrated in accordance with the Smart Specialisation strategy profile on more effective RDI (research, development, and innovation) projects. The Smart Specialisation strategy pushes the region to work towards reaching an innovation approach which:

- attracts top experts and companies from outside the region in the chosen priorities,
- gives all actors in the region, including start-ups, small and large companies, citizens, associations, communities and cities, the opportunity to participate and influence innovation and renewal processes,
- open-mindedly collides different actors and ideas with each other on innovation platforms based on Smart Specialisation strategy spearheads,
- implements a culture of experimentation in the form of new product and service innovations and project experiments.

The region's well-being is enhanced by a strong financial investment in research, development and innovation activities and closer cooperation with domestic and foreign RDI partners. As a result, several EU-funded international RDI projects have been launched, which bring together European as well as Russian excellence. Long-term investments in RDI have strengthened cooperation between the research and the business world, promoted the commercialization of research results, indorsed the renewal of products and services of companies in the region, and increased competitiveness as a whole.

Through the process of Smart Specialisation, the region has undergone a structural change, has reformed its business and industrial structure to become competitive, as regards its own strengths (priorities and spearheads), and has implemented changes in its operating environment. In 2025, Kymenlaakso will be a vigilant implementer and if necessary, an agile modifier of the Smart Specialisation strategy who has adopted experimental culture as an integral part of its smart specialisation strategy process.

According to Kymenlaakso region´s Smart Specialisation strategy, the target/vision for 2025 is as follows: "In 2025 Kymenlaakso, located in the Northern growth zone, will be a vital region that is profiled according to the expertise in chosen growth sectors (logistics, bio economy and digitalization)

and respective RIS3 strategic spearheads, competitive both nationally and internationally as well as attractive for foreign investments and external expertise. National and international strategic partnerships and cooperation strengthen and complement region´s chosen profile."[26] Documentation of regional Smart Specialisation strategy was completed in February 2016 and officially approved in April by Regional Management Committee.

Priority Areas and Spearheads for the Kymenlaakso Region

After the selection of three growth sectors, the strategy process continued with the shaping of sectoral spearheads. Final selection of strategic spearheads was accomplished in late 2015 by project's steering group. Kymenlaakso region´s chosen RIS3 spearheads were:

- logistics: safety and intelligent logistics
- bio economy: new products and business from resource-efficient and low-carbon bio- and circular economy
- digitalization: cyber security and gamification and digital applications in logistics and bio economy as well as in tourism and health a wellbeing.

Kymenlaakso builds on a profound understanding and utilization capability of the cross-cutting role of digitalisation. New products and services are being developed and commercialized especially exploiting the innovativeness at the interfaces of different sectors leveraging the potential of digital applications.

The emergence of innovations requires new forms of local environments i.e. networked and interactive change-sensitive and functioning innovation platforms. The development of innovation platforms needs to focus on the selected Smart Specialisation spearheads. One example of an intensely progressing innovation platform in the Kymenlaakso region is the regeneration process of Kotka Old Port Area where by putting the three priorities into action the overarching vision is to transform a brownfield area on the seaside to a mixed-use area for residents, students, businesses and tourists in a sustainable manner.

Revisiting Kymenlaakso Smart Specialisation Strategy in 2018

Kymenlaakso region has been implementing its RIS3 strategy up to now for roughly three and a half years. In June 2018 regional development actors together with the relevant innovation actors from Kymenlaakso region [Regional Council of Kymenlaakso, Kouvola Innovation Ltd., South-Eastern Finland University of Applied Sciences and leaders of thematic RIS3 working groups (logistics, bio economy and digitalization)] contributed and participated in RIS3 related SWOT workshop. The idea was to map the possibilities and risks of region's alternative futures based on five different scenarios which were delivered in advance by Smart-up BSR project partner Helsinki-Uusimaa region. Scenarios utilized for RIS3 strategy related SWOT synthesis were as follows:

- Protectionism and traditional government power
- Polarized individualism and expert power
- Reliance on local communities
- Global and networked tech-imperialism
- Growth and EU-driven international co-operation.

During the workshop Kymenlaakso´s SWOTs were produced by analysing strengths and weaknesses as well as opportunities and threats in relation to the five different predetermined scenarios. This work resulted in five different RIS3 related SWOTs. The results were processed further and compiled into one SWOT synthesis by collecting all strengths, weaknesses, opportunities and threats

26 Kymenlaakso's smart Specialisation RI3 Strategy 2016-2020. Kymenlaakson Liitto.

into one template. The following characteristics for the Kymenlaakso region were developed according to the SWOT analysis viewpoints:

- Strengths: forest and bio economy-based products
- Weaknesses: structural change region and unfavourable population structure
- Opportunities: expertise in utilizing digitalisation and tourism
- Threats: weak/low competence base and outmigration to growth centres.

From the regional stakeholders' point of view this exercise boosted the use of RIS3 strategy in a concrete way leading to a future revision. The workshop gave an excellent opportunity to practice predicting future scenarios and developing strategic foresight thinking and intensify cooperation and interaction with region´s different innovation actors.

While at the time of writing the strategy revision process is still in progress ongoing new developments and advances in sustainable solutions by local companies are promising growth and expansion. The directions of these developments strengthening biotechnology and bioeconomy are going to be incorporated in the new strategy as key areas of emphasis forming the basis of economic stability and expansion in the region.

Examples of innovative solutions entering the market and showing results coming from local expertise are provided by Kotkamills and PackageMedia in two of the urban centres in the region, Kotka and Kouvula. Kotkamills is using the highest quality renewable raw material from certified forests for demanding uses and has achieved international spread by producing plastic free convenience packaging for take-away food and drinks, thus tapping into a large market. PackageMedia is Finland's only digital package plant and it is the largest in the Nordic countries. The company combines tailored digitally printed packages with growing online markets and commits customers to products in a new way. It is possible to print information about various competitions that activate consumers on the package or build links to social media by means of games. The packages can be supplied with elements that are three-dimensional or contain smart technology. Digital printing is suitable as a cost-effective solution for small series that particularly require flexibility and speed, packages tailored on an advertising campaign basis, or when printing on the product in several language versions is required. Such examples provide a strategically relevant knowledge base to be strengthened in the pending strategy revision aiming at retaining talent in the region.

Other examples of how the local value chain development is gearing up are becoming more visible in 2020. Corporations such as UPM Kymmene, Fintoil, and Finland Mineral Group are in the process of negotiating investments for large scale activities.

Strategy Process of Smart Specialisation in the Kymenlaakso Region

The main orchestrator in the Smart Specialisation strategy development process was Kymenlaakso University of Applied Sciences with a mandate from Regional Council of Kymenlaakso. The strategy process was conducted during 2015-2016 with resources enabled by an ERDF financed and KYUAS led project called KymRIS Smart Specialisation in Northern growth Zone.

The basis for the Smart Specialisation strategy development process was that as many relevant innovation stakeholders as possible could be engaged in the process. This would better ensure the commitment of all parties to a joint regional strategy and vision. Therefore, various stakeholders working within research, development and innovation in the whole Kymenlaakso were invited to RIS3 strategy work. Participants represented small and medium-sized enterprises, associations, educational institutions, vocational and higher education institutions, business development companies and municipal decision-makers.

From the beginning participants consisted of different regional stakeholders involved in RDI activities and the results of the teamwork were used as a starting point for mapping the region's potential growth sectors. The strategy process has been tested with a survey that validated the performance of the strategy work. In January 2016,

the Smart Specialisation development process and its results were evaluated by an extensive Webropol survey sent to a large number of stakeholders. The survey tested the performance of the regional Smart Specialisation strategy process. The survey results validated the Smart Specialisation strategy process and its results, in particular the chosen strategic spearheads.

Stakeholder Involvement in the Kymenlaakso Region

The actual process of developing regional Smart Specialisation for Kymenlaakso region started in June 2015 with a kick-off event. The group of around 50 participants consisted of different regional stakeholders involved in RDI activities. The resulting materials from teamwork were used as a starting point for mapping Kymenlaakso region's potential growth sectors for shaping strategic Smart Specialisation spearheads. The kick-off event´s teamwork materials were further elaborated by the project team of the KymRIS project and the sectoral consultative teams. Elaborated work consisting of valid growth sector specific argumentation was introduced in the early autumn in 2015 to the project´s steering group, which ended up in the selection of three strategic growth sectors: digitalization, logistics and bio economy. Tourism as well as health and well-being were considered also important sectors. However, they did not meet the pre-set criteria derived from the analysis of the operating environment sufficiently to form fourth separate sector. Thus, they were instead merged under digitalization.

Thematic Smart Specialisation working groups for logistics, bioeconomy and digitalisation were set up in late 2016. Two chairpersons were chosen for each working group. Chairpersons represent region´s two development companies and university of applied sciences. SMEs form the basis of members in each working group. The groups differ in composition and activity level. One of the RIS3 working groups´ goal is to create a process where the needs of entrepreneurs are brought more visibly into planning processes of regional development.

In Kymenlaakso a big part of the responsibility for the implementation of the Smart Specialisation strategy was originally assigned to three thematic working groups which were established at the end of the strategy development process. Kymenlaakso's Smart Specialisation strategy guides the use of structural funds and the Regional Management Committee makes decisions on how to channel funding into development projects in accordance with the strategy. The execution of the Smart Specialisation strategy may include various projects which implement the development of the growth sectors and spearheads of the strategy and the activities of the innovation platforms. Ecosystem based thinking is considered a fundamental part of implementing Kymenlaakso region´s Smart Specialisation as it connects actors in the region with innovative processes.

Monitoring Mechanisms of the Kymenlaakso Region

The implementation of RIS3 is closely linked to the selection of appropriate performance indicators and their use in monitoring procedures and possible modification requirements. The use of indicators contributes to the systematic evaluation and supports the continuous learning process. It also provides an opportunity to exchange experience with other regions.

Competence development relates closely to updating RIS3 strategy with the help of new methods and outside expertise. Kymenlaakso region´s innovation actors´ awareness of new methods was risen via Joint Research Centre´s peer exchange learning (PXL) questionnaire exercise done beforehand in connection to Aarhus Innovation Camp´s PXL workshop held in March 2018. Kymenlaakso region´s chosen questionnaire topic was monitoring the RIS3. At that point Kymenlaakso region was taking its first steps in RIS3 implementation and therefore its monitoring practices were not well established. Therefore, by a joint decision of both Kymenlaakso region and JRC it was agreed that Kymenlaakso region was not able to take part in peer-to-peer review regarding monitoring of RIS3 during Aarhus Innovation Camp.

Kymenlaakso Smart Specialisation Strategy Analysis

The strategy work of the Kymenlaakso region has been consistently proceeding step by step to elaborate strategic choices that lead the region out of its limiting environment influenced by the instability of the Russian economy. Instead, the Smart Specialisation strategic development aims to lead the region to strengthen its existing role in the logistics sector and to increase the investment in RDI to enhance the role of its educational and research institutions. As a continuously ongoing collective activity the Smart Specialisation strategy process is constantly involving different rounds of participations. The region commits in its strategy to utilize Smart Specialisation as an ongoing process that can activate innovative approaches and initiate responses allowing modifications. The strategy highlights the integration of two processes the regional strategy creation and Smart Specialisation strategy.

With respect to innovation platforms-based activity, the aim is to enable and enhance networking ability both nationally and internationally, so that enough critical mass will be obtained for operations. Innovation platforms-based activity is already existing. These platforms should be made more comprehensive and internationalized, and targeted support is planned. In addition, the need for new innovation platforms should be evaluated to respond to new rising sectors and strengths, since the objective of Smart Specialisation strategies is to promote experimental activity. The next step will be to develop monitoring practices. Having the tools for monitoring procedures is one of the crucial issues to focus on.

Based on the strategy story of the Kymenlaakso region below follows an analysis of the Kymenlaakso regional strategy process presented through the lens of the Regional Strategy Diamond.

Strategy Formulation - What we Say

Kymenlaakso has three RIS3 spearheads that have gone through a careful selection process.

- Logistics: safety and smart logistics
- Bio-economics: from resource-effective and low-carbon bio- and circular economy, new products and entrepreneurial activity
- Digitalisation: cybersecurity and gamification as well as digital applications in logistics, bioeconomic and tourism, in addition to health & well-being.

The strategy defines priorities for each spearhead and proposes a set of additional 'ideas' that invite the drivers of the three chosen areas to branch out in a creative way. The Kymenlaakso RIS3 Strategy aims at a systematic development of a competitive and attractive innovation ecosystem, increased investments in RDI activities towards smart, sustainable and inclusive growth. The region's ability to implement the strategy will depend on attracting the talent needed and on collaboration with local enterprises to expand the knowledge base.

Strategy Actions - What we Do

The region has secured a strong financial investment in RDI and collaboration with RDI partners, internal and external. Long-term investment in RDI has strengthened cooperation between research and business. As a result, several EU-funded international RDI projects have been launched, bringing together European and Russian expertise. The region's stakeholders have worked together in mapping possibilities and risks. In addition, Kymenlaakso has adopted an experimental culture as an integral part of its RIS3 process. The following targeted action are being pursued:

- Invest in activities with a view to leverage on the exchange with Russian expertise
- Clean energy and ecological building
- Smart, environmentally friendly packaging

Digitalisation is regarded from the perspective of Kymenlaakso's smart specialisation RIS3 strategy as a dynamically cross-cutting theme that significantly affects not only cyber-security and gamification but also the other two selected strategic fields, logistics and bioeconomics and their key features. Possibilities for new ideas and innovations are seen especially at the interfaces in digital applications.

Strategic Competences - What we Have

Knowing what the region has to build on has been facilitated by the mapping work that produced the regional SWOT analysis. Several lacking elements that need improvement were identified along with clear areas of strength. Among the strengths are both the region's reliance on local communities and on EU-collaboration, as well as the capability of its actors to utilize the cross-cutting role of digitalization for growth. Necessary key competences e.g. connected with wood fibre, are increasing in the region, and some innovations are entering the market. Skills in industrial biotechnology are equally important to chart and apply in the development work in the chosen fields. A key to success will be to ensure that the local industry and public sector investments are in alignment.

EXAMPLE: Two of the existing companies showcase how the RIS3 strategy builds on specific regional strengths with the potential to expand the innovation activities: Kotkamills and PackageMedia. Kotkamills situated in Kotka is a game changer in plastic-free and recyclable convenience packaging for take-aways. PackageMedia is an open-minded and innovative enterprise situated in Inkeroinen, Kouvola, rising at the interface of digital applications and the bio economy.

Strategic Competing - How we Win

The required actions to achieve competitiveness are indicated in the strategy as a broad base of ideas and cross-sector combinations as opportunities for innovative outcomes. The region is targeting the activation and development of the selected cutting-edge fields with pivotal procedures in the development of platforms for the relevant innovation ecosystems. Through the Smart Specialisation strategy profile, the region's resources need to concentrate on fewer RDI projects. To increase its winning potential the region needs to focus on the challenging task of attracting top experts from outside the region, which means reversing the current situation of not being able to retain expert labour.

The strategy of the region states a conscious effort to cultivate an open-minded and inclusive approach, which gives opportunities to include diverse stakeholders in the agreed strategic actions. Actors of a functioning winning ecosystem include start-ups and SMEs, citizens, associations, communities and city authorities. These have all been mapped out. By enhancing the collaboration between the development company and the University of Applied Sciences the development of local enterprises can be fostered. The aim is to combine business knowledge and expertise with strong applied research know-how from the university. This cooperation can open new possibilities for graduate students to find employment in local enterprises and vice versa offer enterprises qualified workforce.

Strategy Leadership - How we Lead

Based on the experience with the orchestration of the RIS3 strategy work, the responsibility for RIS3's implementation is assigned to three thematic RIS3 working groups. The goal of each working group is to create a process where the needs of entrepreneurs are included into planning processes of regional development. The essential idea is that SMEs form the basis of the membership in each working group. The groups perform a follow-up linked to the selection of appropriate performance indicators.

Analysis Summary of Kymenlaakso Region

To summarize, the strategy story of Kymenlaakso is approached through the perspective of achieving balance between the 5 angles of the Regional Strategy Diamond. The visualization allows to position the successful actions and the identified bottlenecks (in red). Each of the dimensions in

the Regional Strategy Diamond affects the other dimensions in both positive and negative results. In order to achieve economic transformation, the movement from and towards the angles, inwards and outwards needs to be in constant balance.

Each angle has bottlenecks that need to be solved and efforts in each angle can contribute to the improvements of the overall balance. While investments are needed based on the assessment in the competitiveness angle, a clarified prioritisation in the strategy is necessary to concentrate the efforts. This will also influence the actions dimension. At the same time the alignment of public and private actions will have an impact on competitiveness and competences. Focus in the strategy angle can have a positive effect on increasing talent in the competences area, which in turn can positively affect the leadership context.

For Kymenlaakso it is helpful to proceed by asking questions regarding how the positive and successful outcomes of one dimension can be utilized to get the domains moving towards eliminating bottlenecks, and thus achieving balance from all the angles of the strategy diamond.

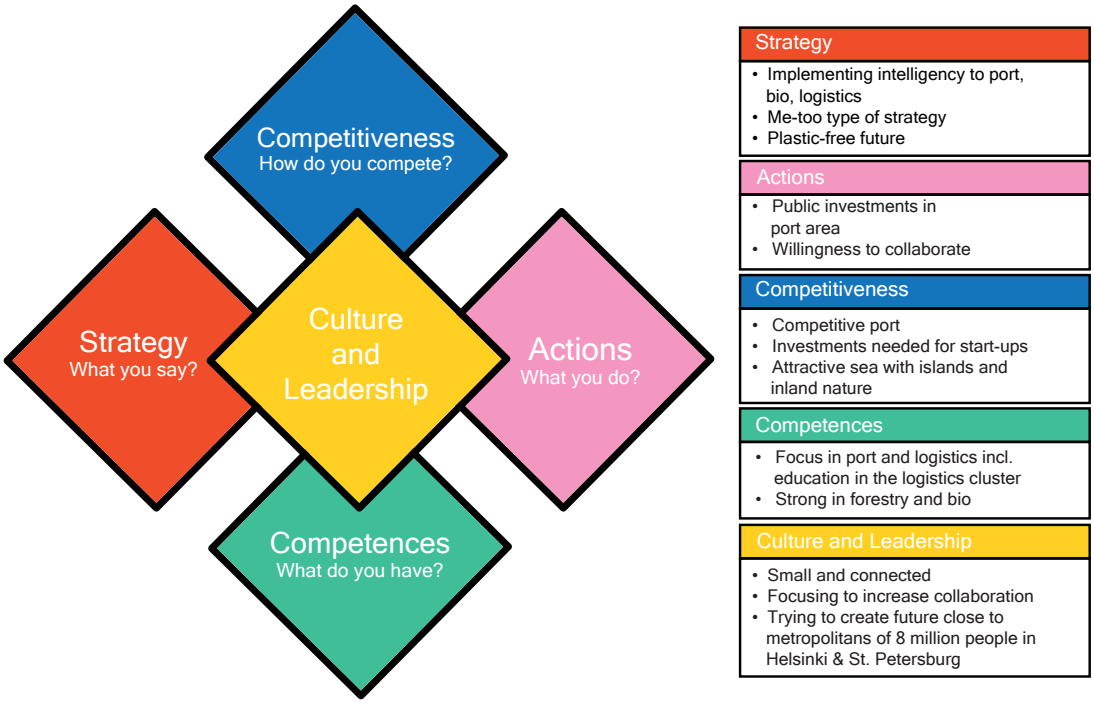
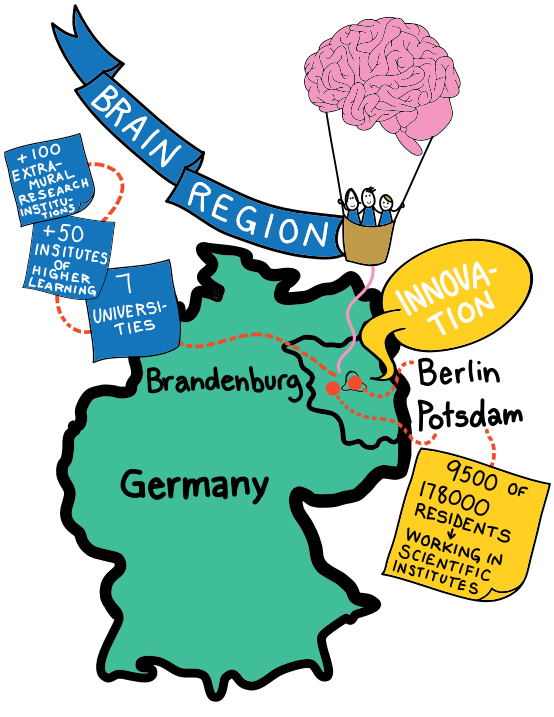


Figure 22 Strategy Diamond of the Kymenlaakso Region

3.8 GERMANY, BERLIN / BRANDENBURG - Brain Region



Together, the Federal States of Berlin and Brandeburg form the capital city region of Berlin-Brandenburg. Given its excellent science and research facilities and the broad range of business-oriented research and development, the capital region holds a top position in Germany's and Europe's innovation landscape.

Berlin as a metropolitan region should be distinguished from Berlin's immediate agglomeration, called Berliner Umland (English: Berlin's surrounding countryside) which comprises the city and the nearby Brandenburg municipalities. Berliner Umland is significantly smaller and much more densely populated than the metropolitan region, as it accounts for the vast majority of the region's population over a fraction of its total land area. As with the joint development strategy also spatial planning policy is jointly managed by institutions of both federal states so that they act in unison in decision making and when cooperating with the federal government and other federal states.

The Brandenburg region contains five independent cities – of which Potsdam the Brandenburg capital is the only one with a population greater than 100,000 – and 14 districts (Landkreise). By adding the inhabitants of Berlin, the two cities Potsdam and Berlin account for more than 80 percent of the total population of the Berlin/Brandenburg region. The Brandenburg area is characterized by suburban settlements surrounding either the Berlin city limits and or comprising small towns in the rural outer area.

Population in the Berlin/Brandenburg area is characterized by contrast with extremely high density in Berlin (4248) and considerably less populated areas in the rest of the territory (86) for 2017. (RIS, 2019). This leads to differences in the fabric of the economy which can be seen when looking at the innovation performance indicators. Another difference worth noting is the high concentration of the employment to public sector jobs in the Brandenburg region. With higher than average Public administration employment occupying 10,7 % in comparison with the EU average of 7% and a below average population density Brandenburg represent a profile less favourable for innovation.

Potsdam: more than 9500 of all 178.000 residents are working in scientific institutes which is the highest scientific density in Germany and therefore in Europe.

Berlin/Brandenburg's science and university community has the most highly evolved research community in Germany with its:

- 7 universities
- Over 50 institutes of higher learning
- Over 100 extramural research institutions, e.g. the Helmholtz Association, the Leibniz Association, Fraunhofer and the Max Planck Society

As a capital city Berlin's strength in attracting competence is based on the peaceful coexistence of diversity which promotes innovation and creativity:

- University and industry transfer centres
- Cluster initiatives
- Innovative networks and patent exploitation agencies
- 46 technology parks and centres with dedicated areas and support services
- A steady flow of highly qualified young professionals is guaranteed
- Universities and institutes of higher learning with roughly 180,000 students
- FU Berlin and the Humboldt University hold top rankings for the number of international guest scientists

The maps below show how the urban area or the state of Berlin is a node in the centre of the Brandenburg state, while the metropolitan region around Berlin actually covers Berlin and municipalities across two states. The territory of the state of Brandenburg comprises a large area in the north-eastern part of Germany reaching to the border of Poland and while Berlin in its very centre is extracted as an independent state.

Regional Key Indicators for the Berlin / Brandenburg Region

Berlin and Brandenburg have each their own profile in the RIS innovation ranking. The Berlin region is in the group of top innovators in Europe as Leader (RIS, 2019). With a score of 145,4 it is ranked as Leader + in the performance subgroups and occupies the 7th rank of all innovative Leader regions in EU-28. The region has seen an increase in performance of 15,7 with reference to 2011.

The Brandenburg region is in the group of top innovators in Europe as Strong Innovator (RIS, 2019). With a score 96,7 it is ranked as Strong - in the performance subgroups and occupies the 89th rank of all regions in EU-28. The region has seen an increase in performance of 0,5 with reference to 2011.

As a way of introducing the context of the Smart Specialisation strategy in the Brandenburg region we track the Regional Innovation Index (RII) as calculated in the Regional Innovation Scoreboard over the period 2011-2019. The two graphs below refer to Brandenburg and present the RII score development between 2011-2019 (Figure 23) and the breakdown of the RII as a regional profile based on the 17 measured dimensions (Figure 24). The table lists the dimensions that constitute the RII profile in order of performance for 2019 with reference to 2011. This data does not include Berlin.

As the figure on the left shows (Figure 23), the regional innovation index shows some fluctuation since 2011 and the current figure for 2019 indicates that performance in innovation is at approximately the same level at 2011. This is after an increase in the earlier years of the decade and a drop in 2017. This movement has been corrected with a rise between 2017 and 2019. However, there is no improvement with reference to 2011 as the change is 0;5.

Figure 24 lists the dimensions that constitute the Regional Innovation Index (RII) in order of performance. The strengths of Brandenburg are found in Non-R&D expenditures, while Public R&D expenditures are found on 5th place and Private R&D expenditures are far lower. However, the strength of Scientific publications stands out among the criteria exposing a higher performance. Innovative SMEs collaborating with others is equally to be considered as playing an important role while there is room for improvement for most of the other dimensions which are lagging behind. The radar graphs illustrate the same RII dimensions compared to Germany and EU.

For more detailed information the tables in Chapter 4 show the development in the six key innovation areas: Life-long learning, Innovative SMEs collaborating with others, Public and Private R&D expenditures, SMEs innovating in-house, Non-R&D expenditures.

To summarize, the results show a clear decline since 2011 in two key areas with only a slight recent up-take: Life-long learning and SMEs innovating in-house. These are the areas that are keeping the average performance down. In the other dimensions Innovative SMEs collaborating with others, Public and Private R&D expenditures, and Non-R&D expenditures there is a constant rise since 2011 (except the recent slight decline in Public R&D

expenditures). This rising trend has pulled the low performance in the middle of the decade and is therefore a promising trend.

Below, the radar graphs of both states, Brandenburg, which includes Potsdam, and Berlin, visualise their complementary relative to the innovation performance indicators. One dimension that stands out in which both territories differ most: Trademark applications. The radar graph shows relative strengths compared to Germany (orange line) and the EU (blue line), relative strengths (e.g. in Brandenburg Non-R&D innovation expenditures, and in Berlin Trademark applications) and weaknesses (e.g. in Brandenburg Tertiary education, and in Berlin Lifelong learning).

In Chapter 4 individual charts of six relevant categories are compiled for more detailed information on the performance in those six specific areas of interest. A general summary of the regional macro-economic indicators of Berlin/Brandenburg is attached in Annex IV.

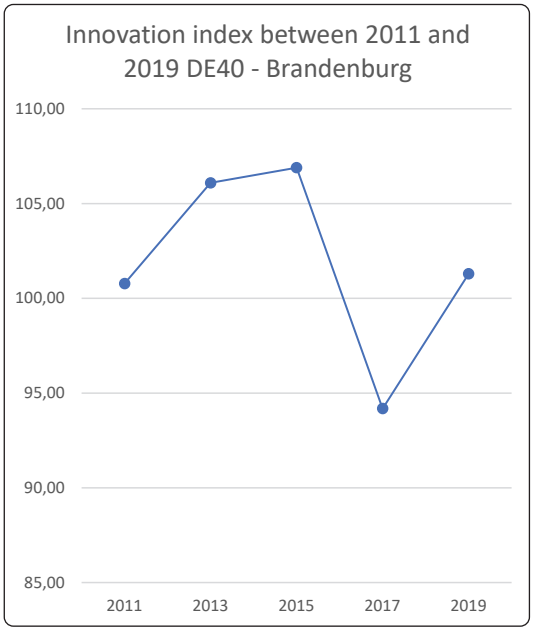


Figure 23 RII Brandenburg 2011-2019

Figure 24 Brandenburg RIS Indicators 2011-2019

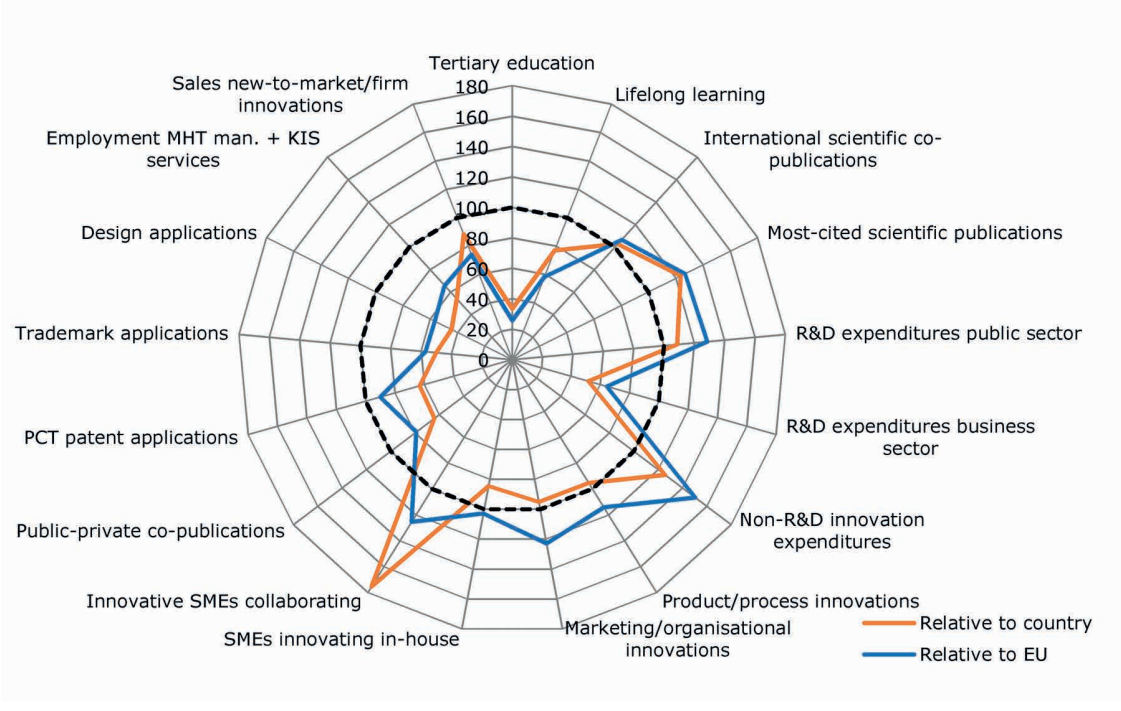


Figure 25 Brandenburg State Radar Graph of RIS Indicators 2011-2019

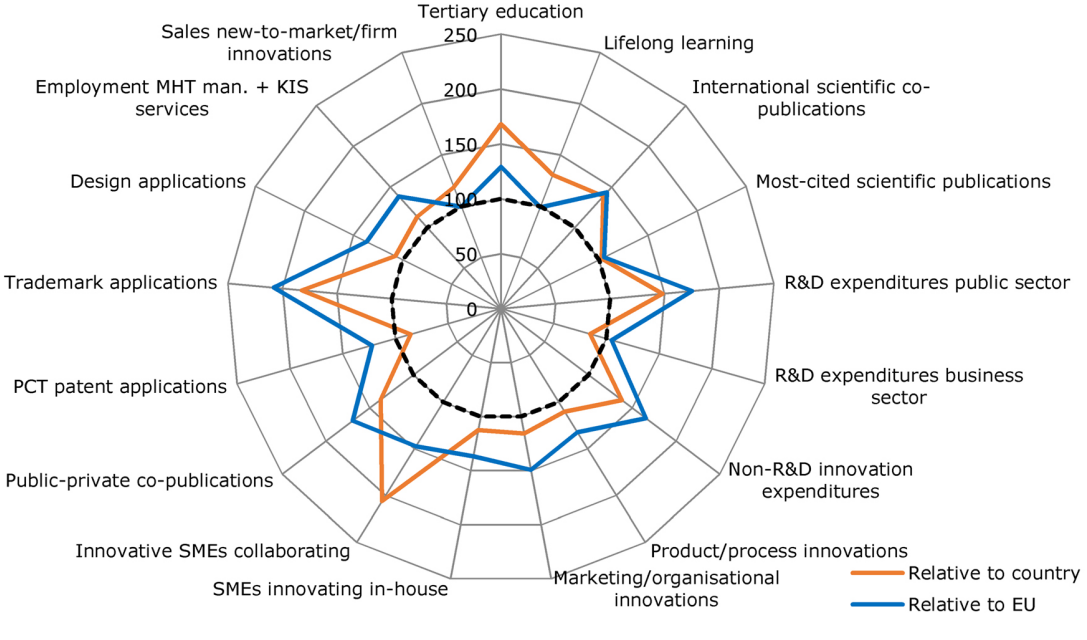


Figure 26 Berlin State Radar Graph of RIS Indicators 2011-2019

Smart Specialisation strategy in the Berlin / Brandenburg Region

The State of Berlin and its neighbouring State of Brandenburg launched their Joint Innovation Strategy known as "innoBB", in 2011, as the first attempt of joining two state level strategies under one common innovation strategy. Aimed at linking the wider reaching business and R&D sectors positioned in Brandenburg and the international innovation community in the capital region, the innoBB strategy focuses on five clusters:

- Life sciences and healthcare
- Energy technology
- Mobility (including transport and logistics)
- ICT, media and creative industries
- Photonics (including microsystems technology).

As a result, the slogan for this strategic collaboration between clusters and between states has since then been 'Excellence in Innovation' and has marked a dynamic innovation landscape around the capital region and its surrounding cross-state territories. Building on this collaboration which has proven to be a successful exchange of knowledge, resources, and expertise between educational and research entities and private organisations and SMEs, a revised strategy was launched in 2019.

The innoBB 2025 clarifies the common goals of the wider capital area actors even further. Collaboration in innovation and the ambition to secure top position with 'excellence in innovation' still defines the cross-country collaboration and innovation strategy innoBB 2025. They vision pivots around two specific goals:

- The capital region will reach a top position in innovation in Europe
- The capital region develops innovative solutions for the challenges of tomorrow

The strategy takes into consideration that social, technological, and economic changes direct regional actors to look into new approaches that produce innovative solutions. Rapid changes need to be met with a mode of action that is more dynamic, better networked, more agile and open to unconventional implementation. The gap between new technological advances and their innovative applications in society invites a future oriented approach towards developments in the five scientific clusters that represent the regional strength areas since innoBB of 2011.

Actions based on the specific strategic goals applied on the five clusters are to follow these guidelines:

- Expanded approach to innovation
- Strengthened cross cluster collaboration
- Opening up innovation processes
- Prioritizing sustainable innovation
- Increased internationalization

The guidelines suggest that the needs of firms, research organisations, SMEs and a broad range of stakeholders are best met through the lens of these principles of action. A broader view on innovation and the actions of each involved regional stakeholder within the clusters will provide fruitful actions in context of global competence and service development, not inciting regional response as an end in itself.

Priority Areas and Spearheads for the Berlin / Brandenburg Region

While the five clusters of strength have already been the focus of innovation development since the first innoBB strategy, their future work is framed within these thematic priorities: digitalisation, real world labs and field testing, work 4.0 and new professionals, start-up founders.

Digitalisation: In the region knowledge around Artificial Intelligence, Internet of Things, autonomous systems and digital economy are at the highest level in Europe. Based on the top expertise and performance in the region digitalisation can

bind several technological landscapes in different clusters and therefore through a cross-cluster approach strengthen the innovation output of the region.

Real World Labs and Field Tests: The region has the ability to participate in close-to-market innovation, by organising user-centred testing and providing a low-risk environment for firms, especially SMEs, to test innovative products and their possible usage and marketability through real world laboratories and field testing facilitation. Clusters will have the role to create the impulses for such prototype testing.

Work 4.0 and New Professionals: Innovations happen through the involvement of people in different roles. Social and economic aspects are going to define the professionals of the future as well as the style of leadership that opens up room for social innovations as well as technological innovations. Education, research, development and training opportunities in the region for future career choices will be created when educational institutions operate cross-regionally in collaboration with a large number of local stakeholders driving innovation.

Start-ups and Founders: The Berlin/Brandenburg region is a hotspot for start-ups in Germany and company founders drive the economy through the digital work transformation in the region. They are able to rethink technologies, products and services and create new socially relevant solutions that also success on the market. These innovation-oriented SMEs are to be supported by various targeted instruments. Similarly, cluster platforms provide —networking possibilities crucial for the development of the regional innovation dynamics.

The stakeholders that operate as motors of each cluster play a central role in pushing forward these thematic priorities, especially with focus on fostering SMEs in bringing their ideas to market. Therefore, it is also of vital importance that clusters as well as social stakeholders collaborate in a constructive manner to operationalise these priorities across clusters and thus make innovations possible that solidify the selected regional spearheads.

- Scientific talents from all over the world also appreciate the open research atmosphere and the high quality of life in the Brain city Berlin
- Berlin's research landscape is characterized by change and progress
- The density of the scientific locations in Berlin and also the networking within European networks brings a lively and dynamic element into research.

Revisiting the Berlin / Brandenburg Smart Specialisation Strategy

The focus of the 2011 strategy has led to a successful development of the five selected clusters. The goal of the innoBB 2025 strategy is to solidify this positive development. The strategy provides for each cluster a masterplan with a political innovation profile which structures and supports the work of the clusters in attaining the strategic vision and the goals of the strategy. In this way each cluster can make use of the specific regional resources and opportunities in working towards the horizontal strategic priorities of digitalization, new concepts of field testing and real-world laboratories, work 4.0 and start-up and founders funding.

In short, the new innBB 2025 strategy underscores the innovation guidelines that have previously brought results acknowledging in an emphatic way that the change brings a considerable rewiring towards solutions of a sustainable, smart and inclusive future at regional, national, and EU level. This is envisioned by

- A broader innovation concept,
- A deeper cross-cluster collaboration,
- A clearer opening up of innovation,
- A greater consistency towards sustainability, and
- A stronger regional emphasis on internationalisation.

Strategy Process of Smart Specialisation in the Berlin / Brandenburg Region

The innoBB 2025 builds on agile forms of collaboration in order to respond to new developments in the clusters in a fast and dynamic way. This entails a political framework that secures the innovation capacity of the collaborating actors in different thematic sectors and across the industrial sectors.

First, most importantly, the framework includes an intensification of the collaboration between the two states of Berlin and Brandenburg with regard to Innovation and technology development. By allowing funding measures to serve a joint implementation overarching both states the path is open for a dynamic execution of innovation activities. This secures future competitiveness by also combining the joint regional instruments with national innovation promotion schemes.

Second, collaboration combining SMEs and start-ups with the excellent research and science institutions located in both states is going to be further elaborated and is going to engage municipal actors. This will result in the strengthening of innovation furthering processes such as incubators and accelerators. The strategic aspects that will be focussed on are:

- Refining the infrastructure for the competitiveness of scientific research at international level
- Stimulating the R&D cooperation between companies and scientific institutions at application level
- Voting for additional financial support for new infrastructure to support collaboration between the two states
- Strongly targeting financial instruments towards RDI collaboration

To achieve these improvements in collaborative processes the innoBB 2025 strategy is accompanied by political commitment to operate in step with the clusters, to maintain constant communication with cluster actors, and to facilitate cross-cluster collaboration. For example, cluster specific masterplans are developed in a participatory way in order to weave in the perspectives of the local and regional actors. While these plans will form the basis for actions driving innovation in each chosen cluster the collaborative methodology will also lead to cross-cluster developments, which is the overarching goal of the innoBB 2025 strategy. The underlying assumption is that a cross-sectional approach can assist the particular clusters in developing relevant innovative solutions for industry-specific benefits.

Stakeholder Involvement **in** the Berlin / Brandenburg Region

An example of the level of stakeholder involvement in the Berlin/Brandenburg Region is the Potsdam-Golm Science Park. From leading international research in areas such as biotechnology, or gravitational physics, to training opportunities for young researchers, to research-based production and commercialisation, numerous aspects of stakeholder involvement combine to make Potsdam Science Park in the heart of the fast-growing region of Berlin-Brandenburg into a location with extraordinary potential for innovation. Spread over an area of more than 50 hectares, the science park offers ready-developed premises, excellent infrastructure and ideal conditions for exchanges between renowned scientific research institutes, technology-oriented and research-based companies, and innovative entrepreneurs. Entrepreneurial activities benefit from knowledge exchange with scientific Institutes and Institutions at Potsdam-Golm Science Park: two faculties of Potsdam University, three institutes of Max- Planck-Society, two institutes of Fraunhofer-Society, the Brandenburg Main State Archive and about 20 small companies (former Start-ups). Nevertheless, Potsdam Science Park is lacking space for the start-up community and a meeting a place for social interaction among people living close by. In the future the ability to interact between the scientific institutions and civic stakeholders needs to be improved. The regular residents lack the opportunity to meaningfully network and exchange ideas between them and

the science/innovation community working in the Science Park.

While cluster management organisations have a clear role to initiate and implement collaboration between industry and science based on the cluster masterplans and thus further stakeholder engagement in projects to continuously increase competitiveness, the local community seldom is a stakeholder in these activities. Engaging the community can be part of the Science Park activities. The task has been approached and the intent is to create a new accelerator model that includes office space for start-ups and incorporates ways of opening high-tech and science to local people e.g. through creating a meeting space, or by jointly using technologies (3D Printing) while sharing the space. With regard to innovative solutions it could also become increasingly attractive for industry to actively join and interact with the community with technology development for social innovation. The task is also to address how the Science Park could help to engage local people with the local associations/NGOs, and researchers/industry for testing environments and meeting spaces.

The aspiration is to serve as a role model for other innovation hubs in Brandenburg and for other Baltic Sea regions and help them build a common identity for the Park & residents.

Monitoring Mechanisms **in** the Berlin / Brandenburg Region

Two ways of monitoring the leverage of regional strategic action for innovation in line with the Smart Specialisation principles. On the one hand activities and projects furthering innovation are monitored with an impact measuring program (EWM, Ergebnis- und Wirkungsmonitoring) targeted at cluster development, including cross-state cluster expansion. This tool allows a continuous follow-up and evaluation of the cluster activities. A regular assessment has the advantage of identifying trends as they emerge and permits adjustments based on relevant indicators linked to the innoBB 2025 strategy and the cluster master plans. Yearly reports are publicly available.

On the other hand, in the scientific and entrepreneurial hub around the Potsdam-Golm Science Park monitoring is done around the Science Park outputs. While the main objective is to position and create a profile for the Science Park that matches its main scientific activities in health and biotechnology, smart solutions and circular economy and climate change (renewable raw materials), the societal impact play an increasingly important role as an outcome. This aspect needs more attention in the future. Currently, Potsdam-Golm works to promote mutually beneficial increased interaction between scientists and companies. The task is to retain start-ups in Potsdam-Golm during their growth phase, while at the same time attracting new science-based start-ups and established companies from the region and abroad.

Berlin / Brandenburg Strategy Analysis

In this analysis the strategy story is approached through the 5 angles of the Regional Strategy Diamond (Ch.1.2). The comments are based mainly on the concisely formulated joint strategy innoBB 2025 covering both independent federal states Berlin and Brandenburg. Given the marked contrast between areas around the German capital Berlin the strategy needs to address two issues: competitiveness of one of the top leading regions in Europe and spill-over from the urban to the surrounding rather rural areas. The joint strategy thus needs to propose how a peripheral region may become smart by implementing place-based approaches and by utilizing the excellence of its neighbouring region.

Strategy Formulation - What we Say

The innoBB 2025 has refined the goals and priorities based on a careful analysis of the previous innoBB strategy implementation. The predominant themes of the strategy are kept consistent with the five clusters of innoBB from 2011: life sciences and healthcare, energy technology, mobility (including transport and logistics), ICT, media and creative industries, and photonics (including microsystems technology). Also consistent is the unique situation of joining the regional development strategy of two federal states. The strategy which includes political commitments formulates action

guidelines (digitalisation, real world labs and field testing, work 4.0, and new professionals and start-up founders). These guidelines are meant to be considered in the cluster masterplans, which are considered crucial for the implementation of the strategy.

Without doubt the cross-state collaboration is very ambitious at local, regional, and national level, yet as a Smart Specialisation strategy equivalent it gives the impression of being inwards looking. Actions directed by this strategy may not guide the region to its full potential. The strategy needs to additionally show a view to an international and global future.

The region occupies the highest level of excellence in Europe and is able to contribute to innovation with a marked European level presence in the EU Commission in Brussels. However, as an exemplary region in Europe a wider international impact could be achieved, this is however not a concern of the strategy.

Strategy Actions - What we Do

In accordance with the formulation of the strategy, actions are focussed on a strategic aim that may appear to lack internationalization. This can easily be explained by the fact that both the Berlin/Brandenburg region has a strong home market. Commitments to resources addressing the need to increase start-ups (Brandenburg) are promising for future actions, however the internationalization of impacts created by the outstanding research institutes, and the Potsdam Golm Science Park is not reflected in the strategy; the strategy does not enhance actions that would bring an outwards looking perspective. In addition, the scientific and research Institutes do not affect the citizens' life, residents are not impacted by the institutes and the researchers are isolated.[27] While the Science Park is putting efforts into creating start-ups, actions like the Innovation Camps are needed to accelerate this process and ensure that the scientific and business communities in Berlin and Brandenburg may cooperate closely to build up on knowledge transfer and innovation.

Other possibilities to secure actions with wide international impact could be tied to the climate change institutes, which could leverage their excellence on a world leading scale. While it can be said that Brandenburg is action driven in terms of project activities, a clear growth direction is not emphasized in the strategy.

Strategic Competences - What we Have

The Berlin/Brandenburg region hosts several top level internationally renowned research institutes in Potsdam, e.g. the Fraunhofer Institute, the Max Planck Institute, the Institute of Climate Change, yet the proximity to capital is not fully leveraged in Brandenburg, especially what concerns the exchange with the local population.

Potsdam has received cohesion funding and the scientific research institutions have considerable EU funding available. Needed action with regards to competence building is however not reflected in the strategy. Therefore, it is not clear whether the available funding can be used for future competences. Tertiary education and lifelong learning were among the low performing indicators in the RIS innovation index for Berlin/Brandenburg.

The Brandenburg strategic approach could be defined as a capital driven strategy, relying on the visibility and scientific magnet of Berlin as the German capital, yet not optimizing the opportunities of the proximity to the capital city. In this sense Brandenburg is not ambitious on strategic terms of its own strengths. Actions however, are seen in projects because national and EU-funding are available, yet they link only loosely to the strategy which omits focus on competence.

Strategic Competing - How we Win

The following challenges need to be addressed in order to maintain and increase competitiveness in the Brandenburg region and thus leverage on the proximity to the capital Berlin:

27 Based on results from the Smart Up project's innovation camp in Potsdam, 2018.

- develop an internationally attractive science and innovation location around the Science Park
- attract an anchor company and further investors
- attract international start-ups to Potsdam
- further develop the entrepreneurial environment (incubator with lab space)
- improve the physical infrastructure
- improve links and matches between stakeholders
- better integrate Science Park / Innovation Hub activities with local community and societal needs
- promote dialogue and interaction between science, policy, and society
- enable evidence-informed policy and decision-making.

Strategy Leadership - How we Lead

The implementation of the innoBB 2025 strategy builds on a political framework that supports agile forms of collaboration between the two federal states especially with regard to technology and innovation. In addition, intensifying joint collaboration the necessary resources are secured as third-party funding answering to national and EU innovation schemes.

Attention is specifically given to clusters development and regional innovation infrastructures that utilizes the high-level educational and research institutions as well as industry research infrastructure and collaboration with innovative SMEs. The strategy includes an implementation framework directed at strengthening the innovation infrastructure development by actively pursuing collaboration between innovation actors and municipalities.

Analysis Summary of Berlin / Brandenburg

To summarize, the strategy story of Berlin/ Brandenburg is approached through the perspective of achieving balance between the 5 angles of the Regional Strategy Diamond. The visualization allows to position the successful actions and the identified bottlenecks (in red). Each of the dimensions in the Regional Strategy Diamond affects the other dimensions in both positive and negative results. In order to achieve economic transformation, the movement from and towards the angles, inwards and outwards needs to be in constantly balance.

The strategy and leadership angles play an important role towards the balance of the diamond though the strategy conveys a direction inwards and is heavily focused on Berlin the capital. A shift in the competences and competitiveness angles towards leveraging excellence internationally and with the local community around Potsdam and Brandenburg will balance out the diamond. Equally, actions in these areas can produce the desired incentives to revise the strategy, therefore each angle can contribute to resolving the bottlenecks and leading to the improvement of the overall balance.

For Berlin/Brandenburg it is helpful to proceed by asking questions regarding how the positive and successful outcomes of one dimension can be utilized to get the domains moving towards eliminating bottlenecks, and thus achieving balance from all the angles of the strategy diamond.

Strategy

- Joint strategy Berlin / Brandenburg
- Reaffirmed chosen priorities
- Cluster driven strategy, energy, transport, ICT, healthcare, optics & photonics
- Berlin capital driven

Actions

- Vivid activity in innovation infrastructure development
- Scientific excellence
- Startup boost in process

Competitiveness

- Top scientific excellence in EU
- Berlin a magnet for students and scientific exchange
- Potsdam international top institutions in growth

Competences

- Strategic guideline for work 4.0
- Top scientists and youth startups in-flow guaranteed
- Strategic focus in transformation, work 4.0 and sustainability

Culture and Leadership

- Collaboration framework between states, innovation actors, cities, region
- Financial schemes to execute
- Ecosystem at innovation ecosystems
- Cultural and historical attractiveness

Figure 27 Strategy Diamond for Berlin-Brandenburg

3.9 LATVIA – Tensions of National and Regional Drivers

Latvia lies on the Eastern shores of the Baltic Sea. Located at the centre of the Baltic States, Latvia also borders with Russia and Belarus to the east and south-east. It shares a maritime border with Sweden on the west. Overall, Latvia has more than 1,9 million inhabitants (2019). Latvia's capital Riga and its metropolitan area are home to more than half of the Latvian population, and consequently most of the businesses are concentrated there. Riga's ice-free port is the largest in Latvia and with its surrounding municipalities Riga forms a strategically important logistics centre. Other municipalities are often devoted to a particular market or logistics sector. The other major cities, like the port cities of Ventspils and Liepāja also provide ice-free ports, while Daugavpils is an important railroad hub. The central part of Latvia is urbanised, while the east and the west territories are sparsely populated, forming pockets of rural areas between several major cities. With forests covering about half of the country Latvia has the 5th highest proportion of forest land cover in the European Union.

According to the data of the Latvia Central Statistical Bureau Latvia had 185 thousand economically active companies at the end of 2018 (top sectors by number of enterprises: wholesale and retail trade including motor vehicles repair; agriculture, forestry and fisheries; unspecified services; professional, scientific and technical services). The 2019 GDP rates at 30.5 billion EUR with an average salary of 1076 EUR (+7,2 % comparing to same period in 2018). Manufacturing sectors amount to 15% of GDP. The main export products in 2019 were wood and wood products (17%), machinery, mechanical appliances and electrical appliances (16.5%), and food manufacturing products (9.7%). TOP5 export partners were Lithuania (17.2% of the total exports value), Estonia (11.7%), Russia (9.2%), Germany (7.2%), and Sweden (6.6%).

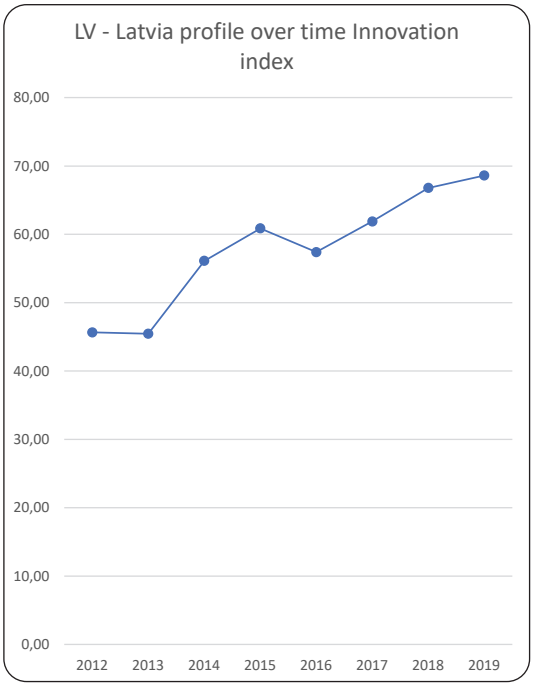
Even though Latvia has succeeded in moving from an achievement rate "modest" to "moderate" in the European Innovation Scoreboard one of the key indicators of economic knowledge and technology capacity – investment in R&D – is significantly low both in the public and the private sectors. By 2020, about one milliard EUR will be invested in programs related to Smart Specialisation goals to strengthen competitiveness of the R&D sector, enhance entrepreneurship, and increase innovation capacity of Latvian economy.

Regional Key Indicators for Latvia

To introduce the context of the Smart Specialisation strategy in Latvia we track the Innovation Index from the European Innovation Scoreboard (EIS) as regional data is not available for Latvia as a country where NUTS1 and NUTS2 level are identical to the country territory.

The two graphs below present the EIS score development between 2011-2019 (Figure 28) and the breakdown of the EIS dimensions (Figure 29). The table lists the dimensions that constitute the EIS profile in order of performance for 2019 with reference to 2011.

The Innovation Index of Latvia 2019 (EIS, relative to EU-28 in 2011) is: Moderate Innovator with 65,7 points. Based on the figures of the EIS country index over time (Figure 28) the trend since 2011 shows a steady increase. The results between 2017 and 2018 indicate that corrective measures may have been



taken after a decline in 2016 and are now showing results that push up. However, on the European scale Latvia's the performance in innovation is still positioned below 70 of EU-28=100.

Since Latvia is listed in the NUTS2 category only, the table on the right lists the dimensions that constitute the Innovation Index at country level, which does not allow a clear regional perspective with benefits the development of the Smart Specialisation strategy. The dimensions commented below are selected as significant for Innovation through Smart Specialisation strategy. A general summary of the regional macro-economic indicators is attached in Annex IV.

Figure 28 Innovation Index of Latvia 2012-2019

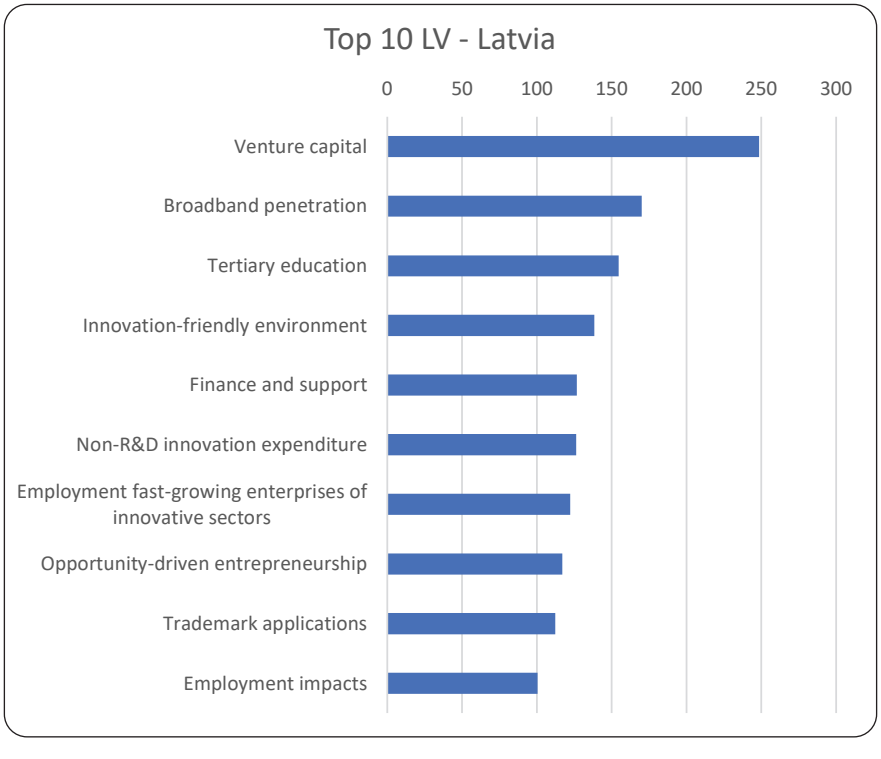


Figure 29 Latvia Profile According to EIS Indicators

The EIS indicators show that there are significant changes happening in terms of leading the country towards a higher participation in the innovation capacity of the Baltic Sea Region. The biggest difference was made first in Venture capital, and second in connectivity, as the Broadband penetration dimension shows. This increases the innovation friendly environment. However, a radical measure needs to be taken towards enhancing Business R&D expenditures which marks the lowest performance along with low PTC Patent Applications. Several indicators across the scale score rather low performance and need improvement to have an impact on the overall innovation index, Public R&D expenditures is an example. Both Public R&D expenditures Business and Private R&D expenditures show a turn upwards after a recent dip. Some significant improvement was achieved in increasing completion of tertiary education. Also, in need of improvement are other science and education related indicators, such as Life-long learning, which already shows an increase since 2015. An upward tendency can also be noticed in dimensions indicating the innovation activity of SMEs, such as SMEs innovating in-house, Non-R&D innovation expenditures, and SMEs collaborating with others, however the performance is still on the lower end relative with EU average. Non-R&D expenditures, Trademark applications, and Employment in fast-growing of innovative sectors show a relatively good position with reference to the EU average.

Smart Specialisation Strategy for Latvia

In the case of Latvia Smart Specialisation strategy corresponds to a national research and innovation strategy for economic transformation. Its importance for defining permanent competitive advantages has been clearly recognized. Through Smart Specialisation Latvia is selecting strategic priorities and designing policy instruments that maximize the country's knowledge-based development potential, thus contributing to economic growth.

For the achievement of economic breakthrough three areas are emphasised:

- Human Securitability (a form of resilience)
- Growth of the National Economy
- Growth for Regions

Interaction of all three system elements is required to achieve the results. However, within this document we will look closer at the priority „Growth of the National economy". Its strategic objectives and defined measurable outcomes defined are the relevant foundation for the Smart Specialisation strategy and its priority areas.

The strategy content is directed by the overall output forecasts as performed by Cross Sectoral Coordination Centre below:

The focus on the priority „Growth of the National economy" provides an example of the coupling of Smart Specialisation strategy and the National Development Plan. This priority has four strategic objectives:

- Highly Productive Manufacturing and Internationally Competitive Services with Export Potential
- Outstanding Business Environment
- Advanced Research and Innovation and Higher Education
- Energy Efficiency and Energy Production

The strategic objectives and measurable outcomes as presented in more detail below.

Strategic Objective "Highly Productive Manufacturing and Internationally Competitive Services with Export Potential": The Latvian economy is characterised by a small number of export-capable sectors and low productivity in the processing industry (the average figure for EU Member States is four times that of Latvia). This renders the Latvian economy particularly sensitive to any changes in the external environment, does not provide the necessary stability and sustainability, and prevents the maximum potential of the national economy from being reached. Only an increase in productivity can ensure the approximation of the average standard of living to the EU average. Goals for the objective:

- In 2020, at least 35% of the investment will be directed towards the formation of productive capital (gross equity capital) in export capable sectors;
- Due to the focus of foreign direct investments on "marketable" (goods and services) sectors, the export growth in the period from 2014 to 2020 will constitute at least 40%;
- Development of commercial creative industries;
- Limited pollution and greenhouse gas emissions in order to respect the goals of sustainable development.

Strategic Objective "Outstanding Business Environment": An outstanding business environment includes a coherent regulatory framework, operation of a stable state support and monitoring system, public services oriented towards the needs of businesses, clear and competitive environment for the start-up and development of business activity so that anyone willing to do so could establish a business, work and live in Latvia. Goals for the objective:

- Creation of an outstanding business environment through an optimal reduction of red tape, the share of the grey economy in the national economy and corruption thus ensuring a predictable tax policy, improving the operation of the judicial system and increasing the efficiency of state administration;
- Ensure the international accessibility of Latvia.

Strategic Objective "Advanced Research and Innovation and Higher Education": Well-developed research and innovation that has been successfully commercialised enables a country to manufacture products that can be exported and provides internationally competitive services. Research and innovation can facilitate greater productivity that is not associated with a reduction in labour costs. The main challenges to achieve a higher level of investment in research and development are reflected below:

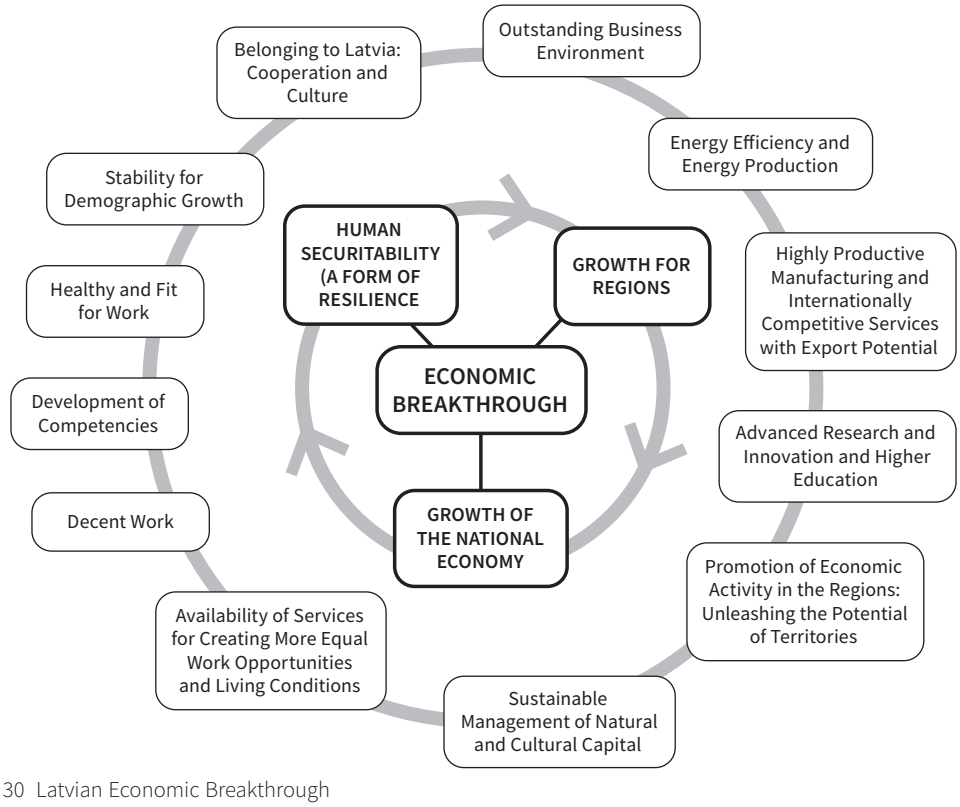


Figure 30 Latvian Economic Breakthrough

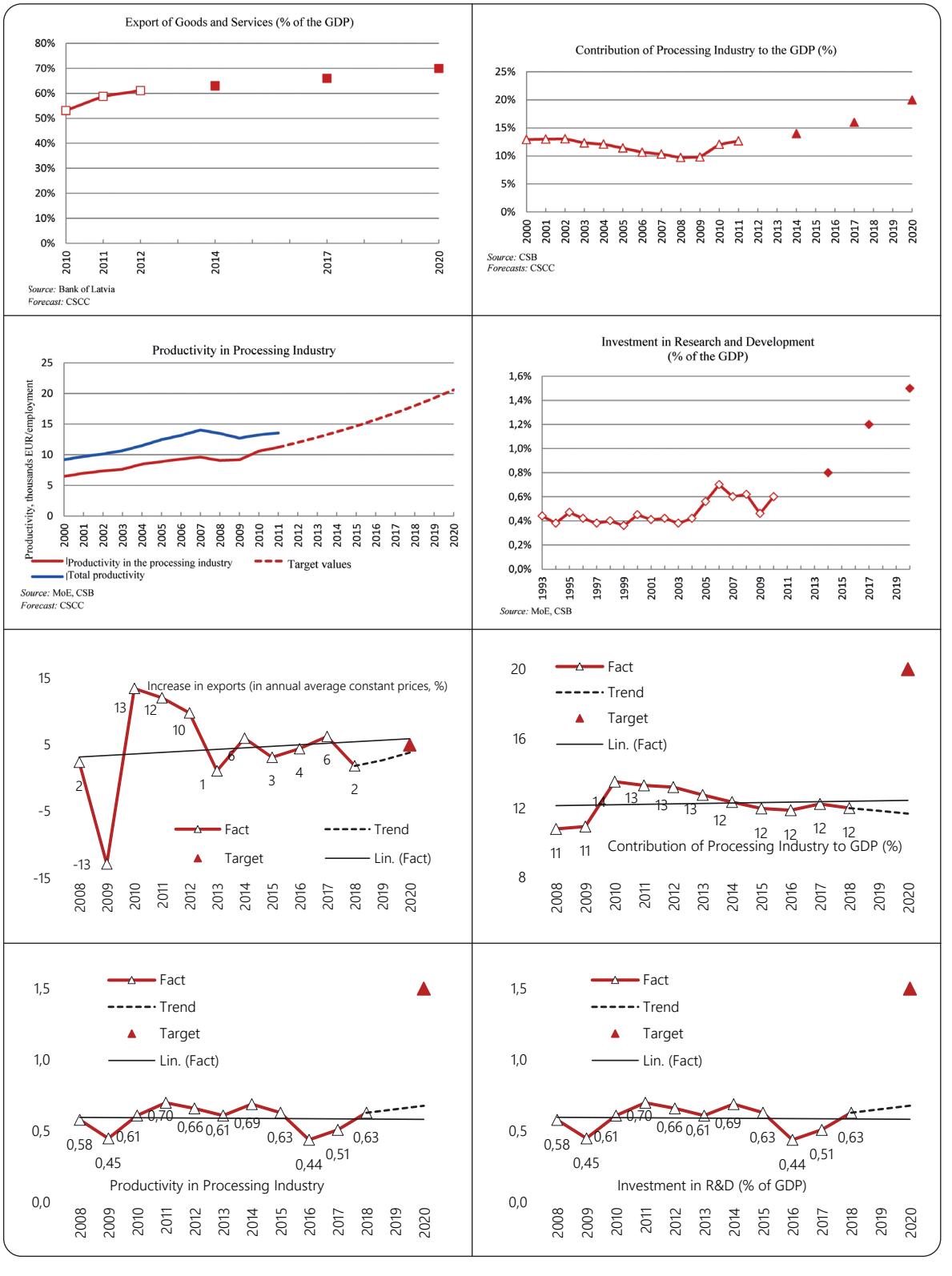


Figure 31 Latvian output forecasts

In science and research, cooperation among parties is crucial, there is a need for the creation of larger and, consequently, more competent and robust associations, thus inducing joint and private-sector investment in research and development. To some extent the favourable geographical location of Latvia also supports the possibilities for establishing international contacts and networking in science. The interest of foreign researchers about announced vacancies for post-doctoral and researcher positions has already been observed and the market cooperation with partners in the BSR is enlarging.

Goals for the objective include:

- Increase investment in R&D to 1.5% of the GDP in 2020, with targeted efforts to attract human resources, develop innovative ideas, improve the research infrastructure, facilitate cooperation between higher education, science and the private sector, as well as the transfer of research and innovation to business;
- Through the commercialisation of knowledge, to promote the creation of innovative and internationally competitive products with high added value as well as their introduction into production, increasing the share of output of such products in the national economy.

Strategic Objective "Energy Efficiency and Energy Production": Energy has now become one of the essential factors ensuring the competitiveness and independence of the national economy. Latvia is rich in renewable energy resources that are currently under-used for energy production in the country. That is why this Strategic Objective provides for the promotion of the use of indigenous energy resources for energy production. Goal for the objective:

- Ensure the sustainable use of the energy resources required by the national economy by promoting the availability of a market for the resources,
- ensure a decrease of the energy intensity and emission intensity in certain sectors,
- ensure an increase of the proportion of renewable energy resources in the total consumption, while focusing on competitive energy prices.

Although the state has an important role in mobilization of entrepreneurs and in the realization of the chosen strategy and innovation systems. The ability of all those involved to cooperate and the ability to expand and intensify knowledge in society on how to increase competitiveness through innovation are the most important factors to achieve the results. The strategy provides funding for such projects that execute implementation in the business and public sectors, and thus expand the knowledge-based economy, by allowing to:

- increase and strengthen human capital;
- concentrate human capital in positions with growth opportunities and appropriate remuneration;
- stimulate the creation of new positions beneficial for research, development and innovation.

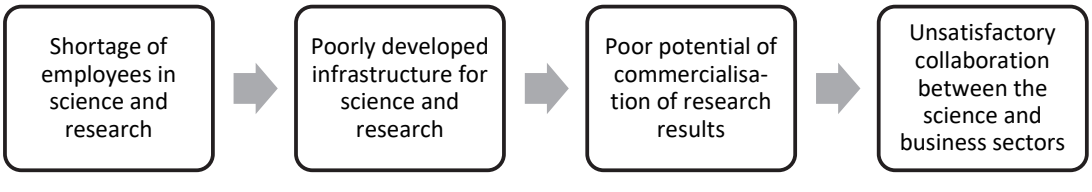


Figure 32 Results of Lack of Investments

Priority Areas and Spearheads for Latvia

The overall system required for economic breakthrough as has been defined by the National Development Plan 2014-2020, involves also Smart Specialisation strategy related directions according to the scheme below in Table 9.

Latvia's national research and innovation strategy for economic transformation leads towards competitiveness through the Smart Specialisation strategic priorities. Policy instruments that maximize the country's knowledge-based development potential, thus contributing to economic growth, will be designed based on the five selected Smart Specialisation areas that take into account the prospective directions of economic transformation. The priorities of economic development are in total six areas: five smart Specialisation areas as well as an additional priority on Social Sciences and Humanities as a cross-sectoral area. (Table 10)

Revisiting the Latvia Smart Specialisation Strategy

The Ministry of Education and Science of Latvia (MoES) has completed second monitoring report of the national Smart Specialisation strategy in 2019. Based on the integrated analysis of the progress the current Smart Specialisation strategy is going to be revised accordingly in order to take into account sector specific needs and improve thematic and sectoral support instruments. Concentrating public R&D investment will produce programs that create future capability and interregional comparative advantage in a more effective manner, also the developing ecosystems will strengthen the innovation capacity of the Latvian economy and provide sector specific incentives for more rapid economic growth.

The Smart Specialisation strategy will be updated to facilitate economic transformation towards higher added value and to enable more efficient use of resources. The knowledge specialization areas still are:

1. Knowledge-intensive bioeconomy,
2. Biomedicine, medical technology, bio-pharmacy and biotechnology,
3. Smart materials, technologies and engineering systems,
4. Smart energy,
5. Information and communication technologies (ICT).

In 2019 MoES and the Ministry of Economics carried out an analysis of the S3 implementation progress from 2014 – 2018 for the second S3 monitoring report. A thematic analysis for each S3 specialization area was done to define the main R&D needs for all five S3 specialization areas for the next 2021-2027 planning period. The main conclusions indicated that when it comes to the overall achievement of the defined S3 target indicator values overall effectiveness of the Latvian R&D system is gradually improving (e.g. Latvian innovation performance amongst other EU countries has improved and the labour productivity has increased as well). This is in stark contrast with Latvia's financial support for R&D (including public investments) that remained almost unchanged since 2014 and it is now certain that the target of R&D investments at 1,5 % of GDP will not be achieved in 2020.

To concentrate public R&D investment in programs that create future domestic capability the strategy has defined three core criteria for allocation of public resources:

- Growth of S&T human capital (knowledge and networks), expressed as increased competence of individuals engaged in projects and opportunities to increase multidisciplinary research and innovations and an increase in research capacity through university graduates;
- Scientific excellence, characterized by the level of usefulness of new knowledge for future or present economic and societal challenges;
- Net economic value or today's financial and social benefits that project will create.

Table 9 Latvian Priorities for Economic Transformation and Smart Specialisation

Knowledge-based bioeconomy	Smart Energy	Information and communication technologies
Biomedicine, medical technology, biopharmacy and biotechnology	Smart materials, technologies and engineering systems	Social Sciences and humanities as a horizontal impact area

Table 10 Directions of the Economic Transformation and Smart Specialisation in Latvia

Transformation direction: Production and export structure change in traditional economic sectors.	**Priority 1**: More efficient use of primary products for the production of higher value-added products, creation and diversification of new materials and technologies. Non-technological innovation, Latvian creative industry potential wider use for production of higher value-added products and services in national economy sectors.
Transformation direction: Future growth industries, in which already exist or may occur products and services with high added value.	**Priority 2**: New products/services that require the development of an efficient identification system capable of identifying and providing support for new product development within existing and cross-industry sectors, as well as emerging industries with high growth potential.
Transformation direction: Sectors with significant horizontal impact and investment in the transformation of national economy.	**Priority 3**: Improving energy efficiency, including the creation of new materials, optimization of production processes, introduction of technological innovations, use of alternative energy resources, etc. **Priority 4:** Modern ICT system in private and public sector. **Priority 5:** A modern education system that meets the requirements of the future labor market and contributes to the transformation of the economy and the development of competencies, entrepreneurship and creativity needed to implement the priorities defined. **Priority 6**: Developed knowledge base and human capital in areas where Latvia has comparative advantages and which are important in the process of economic transformation: knowledge areas related to bioeconomy, biomedicine, medical technology, biopharmaceutical and biotechnology, smart materials, technology and engineering, smart energy and ICT as well as EC identified key technology areas (nanotechnology, micro and nano-electronics, photonics, advanced materials and production systems, biotechnology). **Priority 7:** Identification and specialization of existing resources, highlighting perspectives and directions for economic development, incl. leading and perspective business directions in municipal territories.

Based on the achievement rates reflected above the main areas to improve are laid out as follows:

Table 11 Updated RIS3 Priorities for Latvia

R&D investments reaching 1,5% of GDP	Action 1: Increased state budget investments in R&D; Action 2: Additional incentives for increasing private sector R&D investments incorporated into R&D funding programs' regulations with a purpose to change the behaviour of companies and research organizations in favour of research, development and innovation activities, as well as to change the conditions of the economic environment in order to make them more favourable.
Development of knowledge base and human capital	Action 1: Labour market analysis. Action 2: Implement measures for the training of employees ensuring the contribution in increasing productivity, developing new products and technologies, increasing IT and digital skills, increasing skills in non-technological innovation area. Action 3: Taking into account negative demography trends and emigration, attract foreign specialists. Action 4: Ensure the modernization of STEM study program infrastructure in higher education institutions. Action 5: Investments in academic personnel development. Action 6: Investments in strengthening the governance of higher education institutions. Action 7: Continue Practical Studies and Postdoctoral support realization in order to increase the number the scientists in R&D. support t
Manufacturing industry and it's productivity development	Action 1: Capital investments in acquisition of equipment and machinery. Action 2: The Latvian economy is dominated by low technology manufacturing, where traditionally low value-added products are produced, and the productivity indicators of these sub-sectors are not high. As a result, the competitiveness of the respective companies is weak. The situation is opposite in high-tech manufacturing sub-sectors. The number of companies representing this sub-sector and production volumes in Latvia is small, however the sub-sector is growing sharply. Thus, in order to promote the future development of a more competitive and productive manufacturing industry in Latvia, it is necessary to promote the growth of high and medium technological manufacturing sub-sectors, which are also subject of export volumes growth.
Increase in FDI	Action 1: Increase innovation capacity. Action 2: Investment in human capital. Action 3: Improve accessibility to business infrastructure. Action 4: Support tools for export volume growth. Action 5: Promoting financial accessibility. Action 6: Removing barriers and improving the process of FDI attraction.
Regional development	Action 1: 5 planning regions (Kurzeme, Zemgale, Latgale, Vidzeme and Riga) have established Development programmes up to 2020 and sustainable development strategies up to 2030. Even though the planning documents involve also RIS3 related development goals in general terms, the specific objectives, outcomes, implementation mechanism as well as monitoring mechanism would be desirable to define more specifically per each planning region.

Strategy Process for Smart Specialisation in Latvia

Since 2014 Latvia has joined the EU Smart Specialisation platform to develop competence in Smart Specialisation implementation and to cooperate in research and innovation with other EU regions. For Latvia Smart Specialisation strategy is a national research and innovation strategy for economic transformation, which involves defining permanent competitive advantages, selecting strategic priorities and designing policy instruments that maximize the country's knowledge-based development potential, thus contributing to economic growth.

Researchers of the University of Latvia are involved in sector policy making at national level and contribute with a stable partner network providing a well-developed research infrastructure that serves both locally and internationally. As part of the process of Smart Specialisation this may lead to the following opportunities relevant for meeting the Smart Specialisation challenges at national level as well as in the regional environment.

Stakeholder Involvement in Latvia

The experience of the Smart Specialisation strategy process of stakeholder involvement and the engagement of stakeholders in the innovation ecosystem has resulted into mapping out possible development opportunities:

- Transformation of the services provided by the state and state institutions;
- International and competitive academic environment, cooperation among higher education establishments;
- Support for cross-sectoral projects;
- Facilitation of dialogue between scientists and entrepreneurs;
- Regional Specialisation and connectivity.

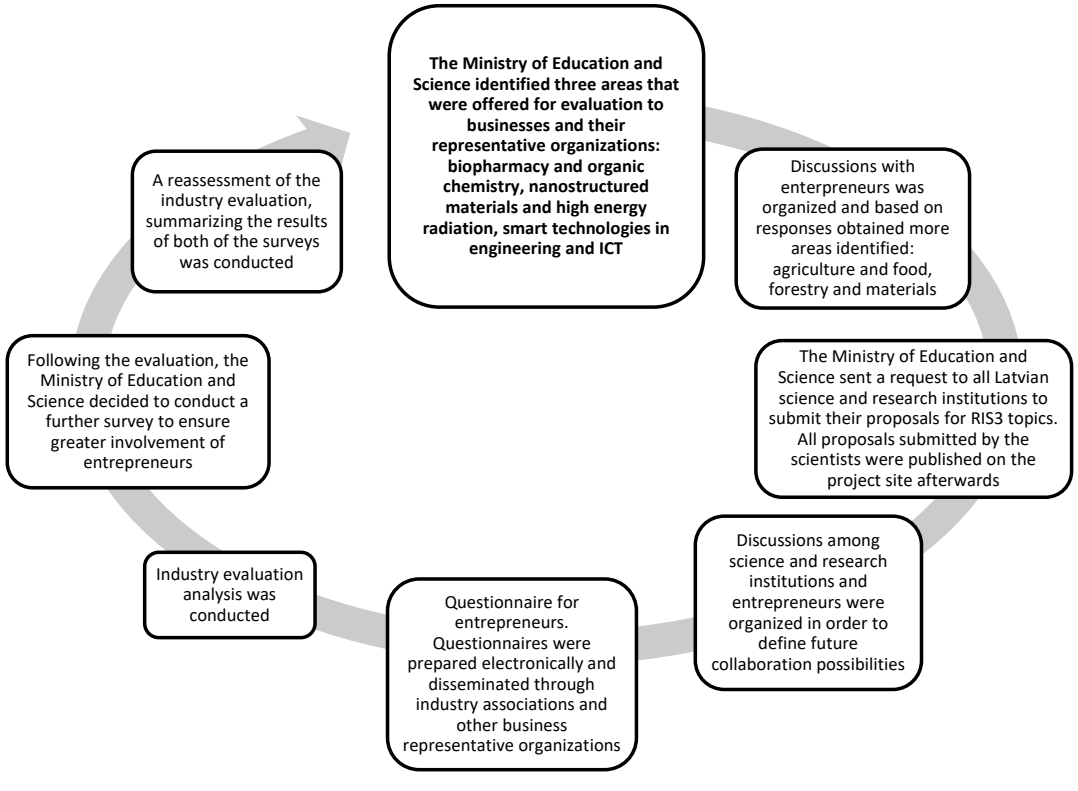


Figure 33 Process of Quadruple Helix Stakeholder Involvement

Descriptions of the ecosystems supporting each specialization are regularly updated to engage stakeholders (policy makers, R&D sector, entrepreneurs and general public) and to provide a context in which the knowledge is created that guides new decisions. This includes following up on the scale of each knowledge area, core challenges, public funds and regulations.

Monitoring Mechanisms in Latvia

Since 2016 a Smart Specialisation monitoring system has been implemented to measure the progress of RIS3 implementation and the effectiveness of the funding invested. The purpose of RIS3 monitoring is to assess the progress of economic transformation over a given period of time in accordance with defined goals and results. The results and conclusions of the data analysis carried out as part of the RIS3 monitoring will form the basis for the development of a new RIS3 and for the architecture of appropriate, mutually integrated national policies. The first RIS3 monitoring report has been issued October 2017 and the second in October 2019.

According to the informative report „Smart Specialisation strategy monitoring system" approved by the Cabinet of Ministers, the RIS3 monitoring report has to be developed every two years by the Institution in charge – Ministry of Education and Science.

Latvia Smart Specialisation Strategy Analysis

Latvia's National Development Plan is the basis for the ambitious national economic transformation and RIS3 is a crucial element leading to the breakthrough in economic growth. The strategy story of the Latvia Smart Specialisation strategy process showed that the engagement in the EU RIS platform is contributing to the competence in RIS3 implementation through cooperation in research and innovation both across regional and national stakeholders internally and with other EU regions. The national strategy process sets the objectives into three major transformation directions. It is primarily an evidence-based development process, where growth priorities for the national economy tie closely with the progress monitoring results. Conclusions based on data analysis can lead to RIS3 revisions forming an architecture of appropriate, mutually integrated national policies. Regular reporting has been given as a responsibility to the Ministry of Education and Science and has the potential to guarantee transformation. The goals and objectives are well defined and the development opportunities clarify the process of transformation.

Based on the strategy story of the region below follows an analysis of the Latvian strategy process presented through the lens of the Regional Strategy Diamond.

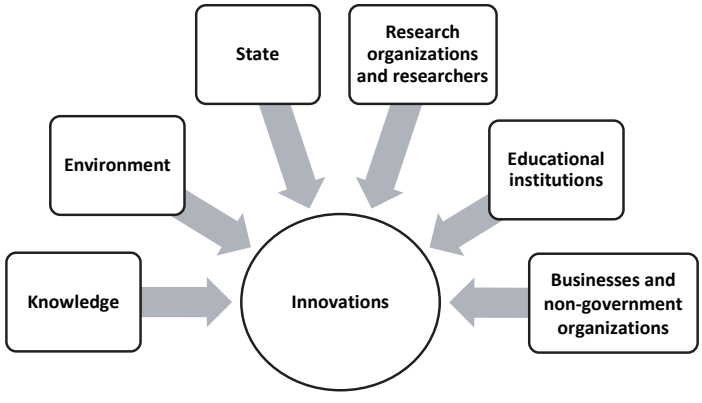


Figure 34 Innovation Ecosystem and Development Opportunities

Strategy Formulation – What we Say

The RIS Priorities and the RIS3 strategy are in alignment with the National Development Plan and provide detailed goals within three specific fields (directions) of economic transformation: changes in the production and export structure of the traditional economy; new product and services and future growth of existing industries; sectors with significant horizontal impact and investment in national transformation of the economy. The system for economic breakthrough as defined by the National Development Plan reinforces the RIS3 priorities.

Strategic Actions – What we Do

Roadmaps are described and are in effect to operationalize Latvia's National Development Plan. These roadmaps define an overall system for economic breakthrough which consists of actions grouped in three sectors: Human Securitability (Resilience), Growth of National Economy, Growth for Regions. Interaction of all system element would be required to achieve the goals. However, a direct correlation with The Growth of National Economy sector and the chosen RIS3 priorities can be observed. The Growth of National Economy sector in the National Development Plan highlights the area of Energy Efficiency and Energy Production while Smart Energy is one of the RIS3 priorities. The other RIS3 priorities fall into two of the other four themes of the Growth of National Economy, while the theme of reaching an Outstanding Business Environment supports the commercialization of the knowledge areas in the priorities. In addition to the Growth of National Economy elements of the National Development Plan, the other two categories Growth for Regions, and Human Securitability support the themes and priorities in essential ways. This inter-relatedness has the advantage of supporting actions from different strategic angles.

In addition, monitoring is assigned and performed, and progress is being evaluated to assess the evolvement of economic transformation over a given period of time.

Strategic Competences – What we Have

Latvia has set up a functioning dialogue between national government, universities and regional government. The Ministry of Education and Science has a system in place for involving quadruple helix stakeholders. The process of involvement has been performed in 8 steps that included discussions with entrepreneurs and science and research institutions, industry evaluations and surveys. An important aspect is the clearly defined development opportunities related to the innovation ecosystem (e.g. services provided by state institution, cross-sectoral projects support, regional Specialisation and connectivity). Having this in place safeguards the possibilities of success for RIS3.

Strategic Competing – How we Win

By strengthening the potential growth areas, by continuing the 'identifying' process in order to recognize the growth potential in areas that are already existing, and by creating the environment for new possibilities to benefit from innovations in products and services. The actions needed are set around strategic coordination for leveraging the collaboration of stakeholders. Development opportunities are created through connectivity and cross-sectoral projects, and facilitation of dialogues between scientists and entrepreneurs.

The investments in cooperation between science, research and business is recognized as crucial and R&D investment is targeting efforts to attract human resources.

Strategic Leadership – How we Lead

Latvia leads by evidence-based strategy making. Strategic priorities have been reached by analysing forecasts, for example by consulting and using projections on the productivity of processing industry, investments in R&D, % of GDP of processing industry, goods, and services. This gives directions to the regions, especially through the strategic objectives' goals setting that are tied with the Growth of National Economy category in the road mapping. The Smart Specialisation strategy monitory system has been approved by the Cabinet of Ministers and reporting will

be performed every two years by the Ministry of Education and Science.

Collaboration between the government at national level and regional level is part of leading the process. The RIS3 updating process resulting into areas that need improvement is based on the measured achievement rates. Regional development as a process is itself a focus among the areas to be improved. A more detailed specific plan is expected from the regions. The plans of the regions are being drafted locally and are integrated with the RIS3 objectives.

Analysis Summary of Latvia

To summarize, the strategy story of Latvia is approached through the perspective of achieving balance between the 5 angles of the Regional Strategy Diamond. The visualization allows to position the successful actions and the identified bottlenecks (in red). Each of the dimensions in the Regional Strategy Diamond affects the other dimensions in both positive and negative results. In order to achieve economic transformation, the movement from and towards the angles, inwards and outwards needs to be in constant balance.

Each angle has bottlenecks that need to be solved. Latvia mostly needs to put in place the angles of strategy and leadership, but efforts in each angle can contribute to the improvements of the overall balance. Though the angles of competitiveness and competences show that major advances have been done the strategy angle needs to acquire more clarity of purpose for the positive developments in the other angles to be leveraged. Solving the tension between national and local/ regional level will contribute to effective actions, while the lack of clarity and determination in the angles of strategy and leadership are in the way for actions to have full impact.

For Latvia, improvement in the balance could come from asking questions with regard to how the positive and successful outcomes of the angles of competitiveness, competences, and even actions could be utilized to get the lagging domains moving. In the process of revising the strategy and the leadership angles leveraging successes is equally impactful eliminating bottlenecks, thus constant revision activities are important for achieving balance from all the angles of the strategy diamond.

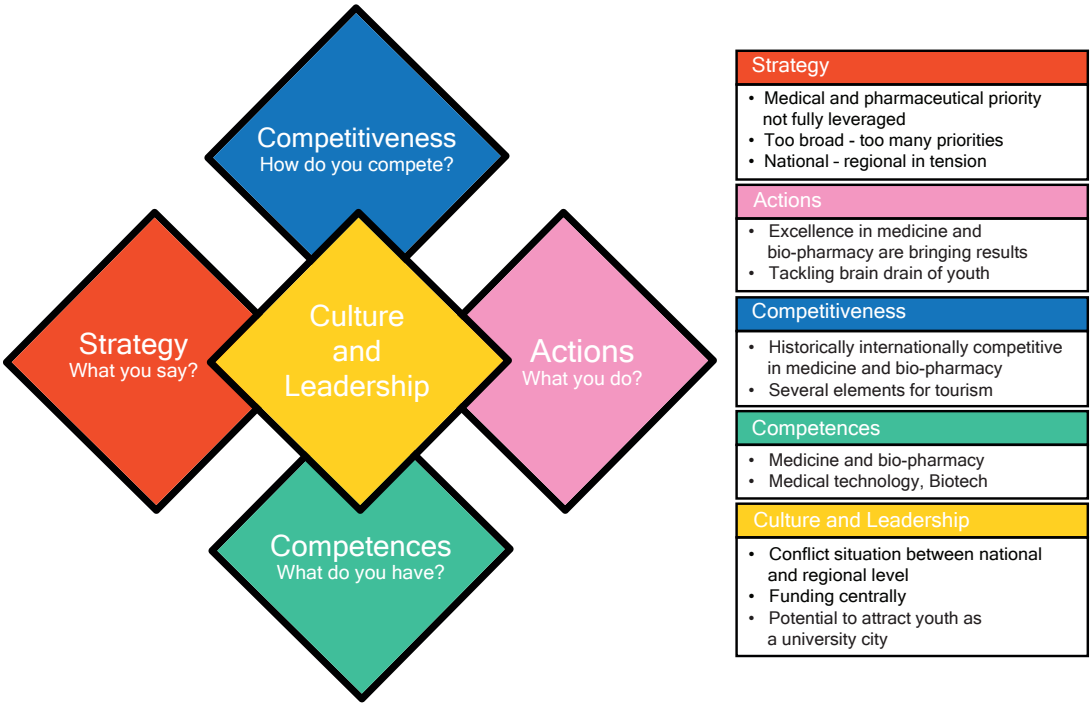


Figure 35 Strategy Diamond of Latvia

3.10 LITHUANIA – Agency Driven Strategy

Lithuania is the largest and most populous of the three Baltic states. The country with a coastline to the Baltic Sea in the West is bordered by Belarus, Latvia, Poland, and Russia (Kaliningrad) and it shares a maritime border with Sweden.

Prior to framing the Smart Specialisation strategy Lithuania had no clear policy focus on innovation. The EU structural fund financing was scattered among various institutions without much coordination and different ministries and funding institutions sought to pursue their own areas of priority. As a former Soviet state Lithuania's challenges relate to governance and a slow adaptation to mainstream the ecosystem of innovations. Among the challenges of the Lithuanian public sector is its efficiency of governance as established by applying measures such as aggregate indicator of voice and accountability, political stability, government effectiveness, regulatory quality, rule of law and control of corruption (Reimeris, 2016). The deficiencies of the public sector are inevitably transferred to the field of innovation. However, the Smart Specialisation strategy process has indicated several steps forward towards a strategic and focused approach to innovation.

After the regional and national indicators in the section below, the following sections aim to present an overview of the Smart Specialisation strategy in Lithuania by describing the way it was developed and updated, its link with national programs for the innovation-based ecosystem. In addition to the Smart Specialisation monitoring and implementation mechanisms, regional tools for involvement of quadruple helix stakeholders are presented, as well as a regional perspective of the national Smart Specialisation strategy through a city example: the Klaipeda case.

The interim report of the Smart Specialisation process in Lithuania showed visible positive results. It states that the selected directions for smart Specialisation help to generate a quarter of GDP in Lithuania, 8.2 billion of value added. The largest share of GDP is generated by manufacturing processes and materials (8.1% of GDP) and transport, logistics and information and communication technologies (4.3% of GDP). Also, the companies in the Smart Specialisations sector employed 41% of all the labour in the country. The four main priorities show the highest efficiency and potential: molecular technologies, functional materials, laser technologies, and public health. Lithuania's Progress Strategy constitutes "Lithuania 2030" goals and strives to foster research-business collaboration, implementation of joint projects and joint use of R&D infrastructure. It also contains a set of demand-side innovation policy instruments, e.g. innovative public and pre-commercial procurement, regulation, financial and tax incentives for innovation consumers.

Regional Key Indicators for Lithuania

As a way of introducing the context of the Smart Specialisation strategy in Lithuania it is helpful to use both EIS and track the RIS ranks. The Regional Innovation Index (RII) for Lithuania is calculated in the Regional Innovation Scoreboard relative to the EU performance in the same year, while the EIS calculates the performance of the whole country relative to the EU performance in 2011, which is what we are using for the other BSR countries and regions in this study. Lithuania is divided in two regions in the NUTS classification LT01 (Most

of the country) and LT02 (Vilnius). Here, the data for the country as a whole is indicated due to comparability to the other two Baltic countries in this study. Therefore, measures of the LT00-data are used.

The two graphs below present the EIS score development between 2011-2019 (Figure 36) and the breakdown of the EIS dimensions (Figure 37). The table lists the dimensions that constitute the EIS profile in order of performance for 2019 with reference to 2011.

The Innovation Index of Lithuania 2019 (EIS, relative to EU-28 in 2011) is: Moderate Innovator. The RII ranking for the two regions (relative to the EU performance in 2019) discloses the difference between the performance in the capital region with Vilnius as a hub for innovation and the other region covering most of the territory. The capital region including the two major cities of Vilnius and Kaunas has a RII of Moderate + with 86.4 points, the rest of the country including the city Klaipeda score at 65.4. Worth noticing is that performance has increased strongly for both regions. RIS calculates a change of 25.5 and 18.5 respectively (relative to that of the EU in 2011).

Based on the figures of the EIS country index over time in Figure 36 below the trend since 2011 shows a steady increase. The results between 2017 and 2018 especially indicate that corrective measures may have been taken after the small decrease in 2016 and are bringing results.

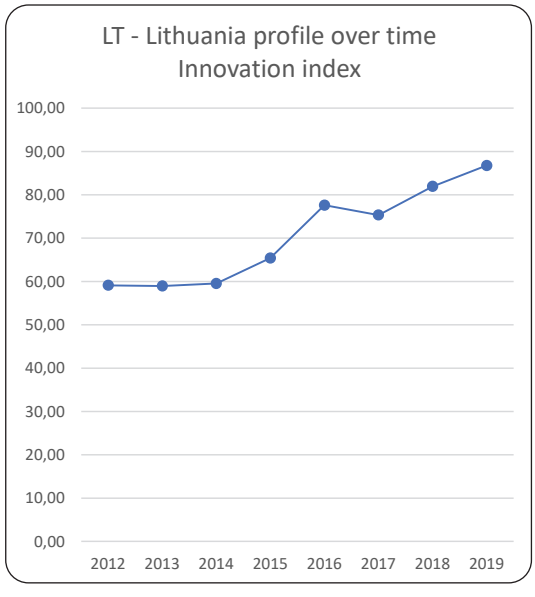


Figure 36 EIS of Lithuania 2012-2019

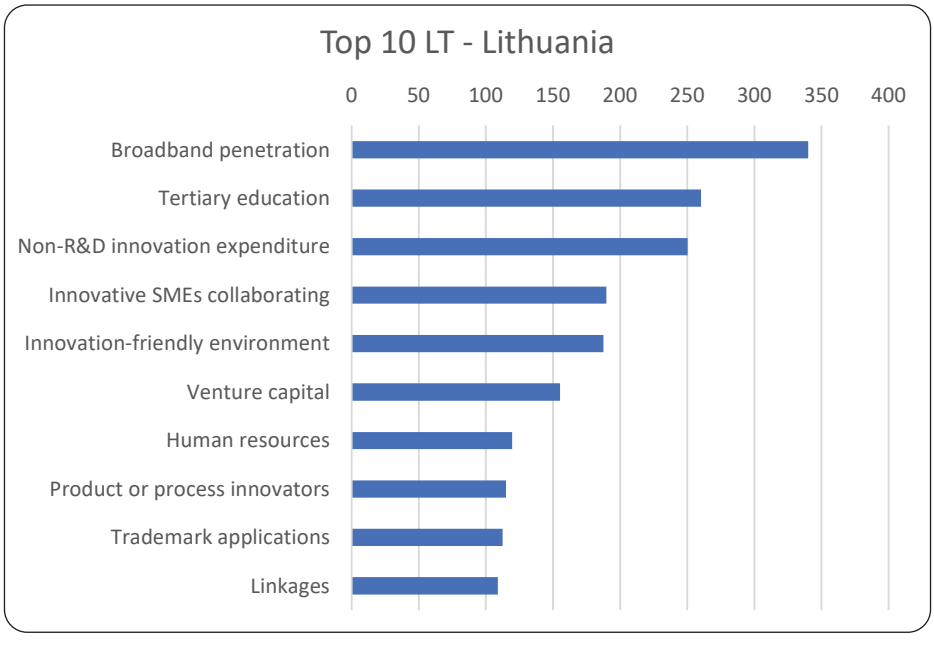


Figure 37 Lithuania Profile According to EIS Indicators

There are significant changes happening in terms of leading the country towards a higher participation in the innovation capacity of the Baltic Sea Region. The biggest difference was made in connectivity as the Broadband penetration dimension shows. This increases the innovation friendly environment. However, more needs to be done for enhancing Opportunity driven entrepreneurship. Some fairly good improvement was achieved in increasing completion of tertiary education, and also with companies raising their Non-R&D expenditures, which shows a high increase and also includes some increase in Private co-funding of public R&D expenditures. Another clear increase can be seen in Innovative SMEs collaborating with others, which is an improvement in the linkages between actors as a mode securing innovation pre-requisites. The steady dimensions have been Trademark applications and Sales of new-to-market and new-to-firm products. At the lowest among the innovation dimensions are Finance and Support Indicators with R&D expenditures having dramatically decreased. Also, in need of radical improvement are science and education related indicators, for example Lifelong learning though having slightly increased is still at a very low level at only 50 with reference to the EU performance. More detailed graphs of relevant indicators over time are listed in Chapter 4, and a general summary of the regional macro-economic indicators is attached in Annex II.

Smart Specialisation strategy in Lithuania

The Smart Specialisation approach for the Research and Innovation (R&I) policy in the EU already has effects on stakeholder engagement, decision-making processes, monitoring and evaluation mechanisms and many more processes. The impact is present in research and innovation systems EU wide, and in most regions, there is readiness for the next generation of Smart Specialisation strategies. However, there is little evidence about the impact of Smart Specialisation strategy for the transformation of the economy for a particular region. Projected impact assessment and evaluation mechanisms - the tool at stake to understand the gathered evidence - tend to be used in ex-post scenario, rather than at an interim stage, when there is still a chance for adjustment of the strategy.

Smart Specialisation strategy functions as a state support programme for RDI (the Programme was approved on the 30th of April 2014 by the Resolution of the Government of the Republic of Lithuania No 411) in which Lithuania, like other European Union countries, has set its RDI priorities, considering existing or potential competitive advantage. Priority directions for RDI were determined by analysing the potential of business and research in Lithuania, including the human capital.

Lithuania has allocated around €800 million (with ESIF) to its Smart Specialisation strategy during the lifespan of 2014-2020 programming period. Main implementing ministries, the Ministry of Economy and Innovation and the Ministry of Education, Science and Sport – have initiated 22 measures, targeting businesses, researchers, research institutions, as well as business – research collaboration projects. The design of Smart Specialisation strategy was based on six broad priority areas, which translated into 20 specific priorities, going down to the level of technologies.

The process has started with an analysis of the global and domestic challenges, and the national scientific and entrepreneurial potential. The investigation of the scientific excellence resulted in determining six top-notch scientific fields. Meanwhile, a review of Lithuanian economy strengths and prospects for knowledge-driven growth were investigated. The final priority fields for national innovation priorities were also mapped (figure 38).

In order to encourage the transformation of national economy and its competitiveness, the programme forms the basis for the smooth and effective development of the RDI priority areas by means of relevant instruments and coordination of actions of all institutions as well as stakeholders interested in the RDI development. During the period of 2014-2020 considerable attention has been devoted towards developing a high value-added economy.

Approximately 10 percent EU funds were allocated for RDI promotion, with 8% promoting small and medium-sized businesses. These funds were used to increase:

- the number of new innovative enterprises and to accelerate technological modernization,
- the share of innovative Lithuanian companies cooperating with higher education institutions until 2023 from 9.8% to 12.8%.

Finally, Smart Specialisation strategy aims to promote integration of at least 4 Lithuanian research infrastructures into international research infrastructures. (Figure 39)

Priority Areas and Spearheads for Lithuania

The Initial S3 Priorities concentrated on two levels of priorities fields that were in turn defined through smaller priorities, each of them having separated roadmaps and implementation programmes.

The initial S3 priority fields focused on:

1. Energy and sustainable environment, with identified more detailed priorities:
- Smart energy systems (smart systems for energy efficiency, diagnostic, monitoring, metering and management of generators, grids and customers);
- Energy from biomass and waste (energy and fuel production using biomass / waste and waste treatment, storage and disposal);
- Digital construction (technology for the development and use of smart low-energy buildings);
- Solar energy (solar energy equipment and technologies for its use for the production of electricity, heat and cooling).

2. Health technologies and biotechnology, with identified more detailed priorities:
- Molecular technologies (molecular technologies for medicine and biopharmaceutics);
- Advanced technologies for health (advanced applied technologies for individual and public health);
- Advanced medical engineering (advanced medical engineering for early diagnostics and treatment).

3. Agro-Innovation and food technologies, with identified more detailed priorities:
- Safer food (sustainable agro-biological resources and safer food);
- Functional food (functional food);

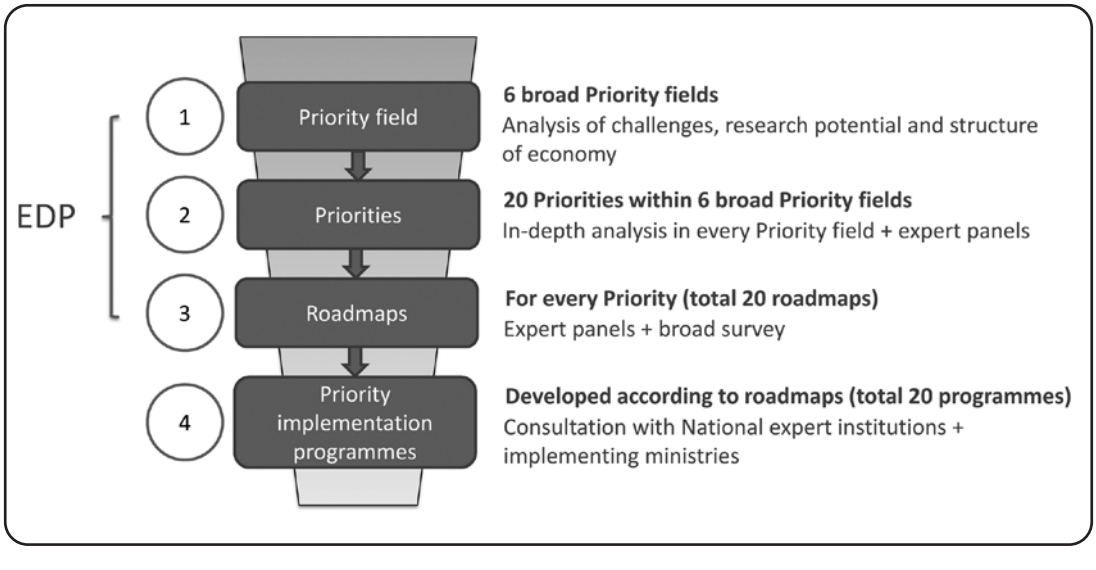


Figure 38 Initial S3 Development Scheme. Source: Strata

- Biorefinery (innovative development, improvement and processing of biological raw materials).

4. Novel production processes, materials and technologies, with identified more detailed priorities:
- Photonic and laser technologies (photonic and laser technologies);
- Functional materials and coatings (functional materials and coatings);
- Structural and composite materials (structural and composite materials);
- Flexible production systems (flexible technological systems for product D&P).

5. Transport, logistics and information and communication technologies, detailed priorities:
- Smart transport and ICT systems (smart transport systems and ICT);
- International transport corridors (technologies / models for the management of international transport corridors and integration of modes of transport);
- Digital content (advanced digital content development technologies and information interoperability);
- Cloud computing and services (ICT infrastructure, cloud computing solutions and services).

6. Inclusive and creative society, with identified more detailed priorities:
- Educational technologies (modern self-development technologies and processes which encourage creative and productive personality building);
- Implementation of breakthrough innovations (technologies and processes for the development and implementation of breakthrough innovations).

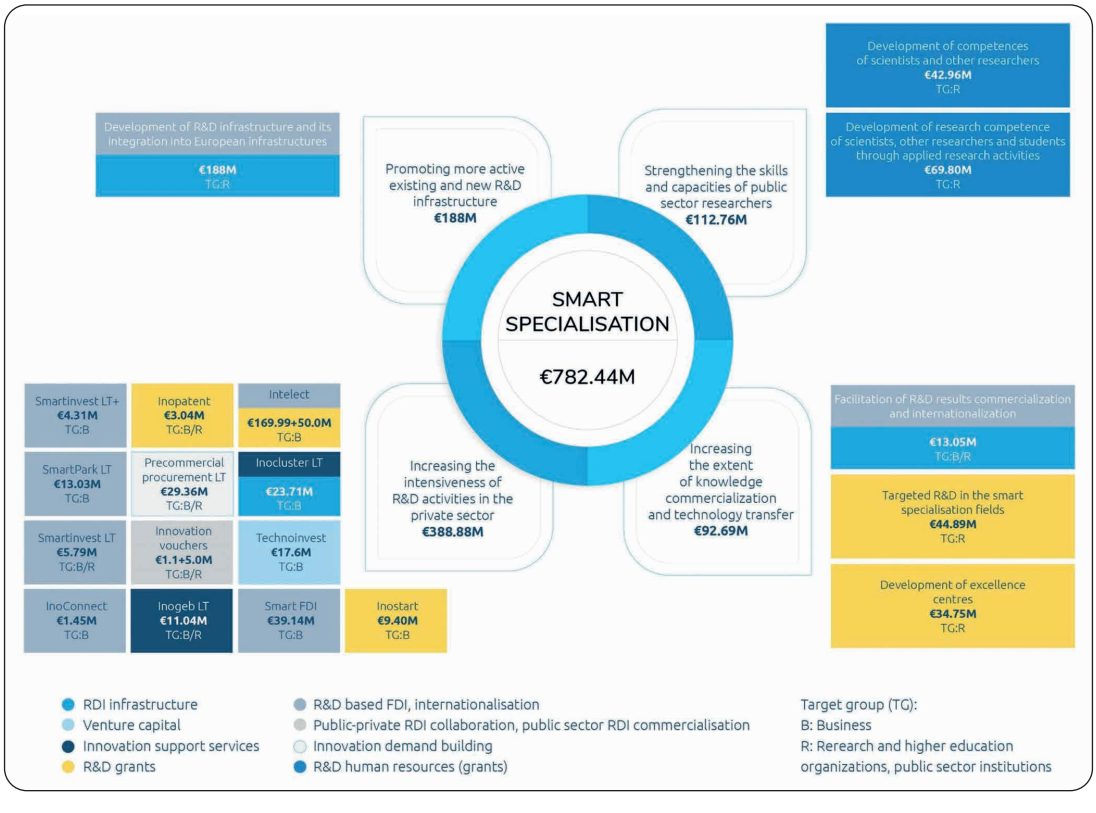


Figure 39 Scheme of EU Funding Policy Mix in Lithuania for 2014-2020

An updated version of The Programme on the Implementation of the Priority Areas of Research and (Socio-Cultural) Development and Innovation (Smart Specialisation) and their Priorities was approved on the 24th of July, 2019 by the Resolution of the Government of the Republic of Lithuania No 760. In the new, updated S3 programme, based on the interim evaluation of progress in the implementation of the Smart Specialisation strategy and on past Action Plans, 7 priorities for RDI are identified:

1. Energy and sustainable environment, implemented through these themes:
- Enhancing interoperability between distributed generation and centralized generation, grids and energy efficiency systems;
- Meeting the needs of existing and new end-users, strengthening energy efficiency and awareness;
- Development of renewable biomass and solar energy and waste recycling.

2. Health technologies and biotechnology, implemented through these themes:
- Molecular technologies for medicine and bio-pharmacy;
- Advanced applied technologies for personal and public health;
- Advanced medical engineering for early diagnosis and treatment.

3. Agro-innovation and food technologies, implemented through these themes:
- Sustainable agro-biological resources and safe food;
- Waste-free recycling of bio-raw materials into valuable components.

4. Novel production processes, materials and technologies, implemented through these themes:
- Photonic and laser technologies;
- Advanced materials and structures;
- Flexible product development and manufacturing technologies.

5. Smart, Green and Integrated Transport, implemented through these themes:
- Intelligent Transportation Systems;
- Technologies / models for international corridor management and intermodal integration.

6. ICT - Information and Communication Technologies, implemented through these themes:
- AI - Artificial Intelligence, Big Data and Distributed Data;
- IoT – Internet of Things;
- Multimodal Analysis, Processing and Deployment;
- Cyber Security;
- FinTech - Financial Technologies and Blockchains.

7. Inclusive and creative society, implemented through these themes:
- Modern Educational Technologies and Processes;
- Design and Audio-Visual Media Technologies and Products;
- Social and Cultural Innovation for the Development of Societal Development Products and Services, Innovative Business Models;
- Flexible and Applied Process Control Technologies.

Revisiting Lithuania's Smart Specialisation Strategy

During the design of Lithuanian Smart Specialisation strategy in 2012-2014, an interim evaluation and possible correction of the programme were hard coded into the Government decree, creating not only a mandate to perform it, but a real anticipation among all stakeholders as well. More than 600 business sector projects and 200 research projects have been funded so far, and about half of the allocated budget was contracted until the end of the 2018. Only one priority did not attract more than 100 projects, and only 9 priorities out of 20 had accumulated funds above €10 million. Priorities that received most of the funding were: molecular technologies (€32 mil), functional materials (€28 mil), and laser technologies (€17 mil). The concentration of investments is insignificant,

mainly due to low intensity of financing. 45% of the applications were rejected, mainly due to their proposals' lack of R&I activities.

Too detailed a specification of priorities in the official documents can become an obstacle for innovative ideas, because the evaluators would look for certain keywords rather than the logical connection. "Super-priorities", meaning those that would perform in every aspect of intervention, have not emerged yet.

The process of interim evaluation of Implementation of the Programme and its Action Plans started in the end of 2018, as foreseen in the regulation and was finalized in July 2019. Although it is too early to discuss the impact of Smart Specialisation strategy for the economy of Lithuania, it is possible to understand the "traction and direction" of implementation, to search for various signals and take actions. Along evaluation of available data from monitoring, the official EDP process was re-established, involving relevant stakeholders. Overall, 130 participants from research and business fields participated and 42 workshops were organized, in view of assessing the policy mix, the relevance of the priorities and other criteria.

At the end of 2018 year an Interim Evaluation of the S3 Program Progress was carried out. After analysing the evaluation results and after assessing the potential and future perspectives of the individual priorities, there were presented detailed conclusions, recommendations and possible scenarios for further investments in the relevant areas and the formulation of new thematic directions.

On the basis of the interim evaluation there was prepared updated version of The Programme on the Implementation of the Priority Areas of Research and (Socio-Cultural) Development and Innovation (Smart Specialisation) and their Priorities, that was approved on the 24th of July, 2019 by the Resolution of the Government of the Republic of Lithuania No 760.

After taking into consideration the monitoring data and results of S3 implementation in the beginning of the EU financial period of 2014 – 2020, it was decided to abandon the logic of two-level hierarchy S3 priorities and stay with the broader and more inclusive single level. Out of 6 priority areas and 20 priorities, 7 priorities were reformulated with the involvement of EDP (Entrepreneurial Discovery Process) stakeholders and One Roadmap – Implementation Action Plan.

The main reasons to choose the "scaling up" scenario are based on these arguments:

1. The "scaling up" scenario helps to secure investing in smart Specialisation direction sustainability and continuity, maintaining the main investment directions;
2. This change simplifies project selection procedures that should increase science and business involvement in implementation of R&D measures;
3. The simplified structure allows the implementation of complex project, that integrate different R&D technologies;
4. Reduction of administrative burden (out of 20 actions plans there remains only 1);
5. Increase of effectiveness and accuracy of monitoring for evaluation of the impact of smart Specialisation' priorities on Lithuania' competitiveness;
6. Performing the largest number of projects priorities with above median scientific and business indicators, in financial terms did not accumulate significantly distinguished amounts in relation to other priorities. Systematically most applications are rejected for absence of R&D activities;
7. The situation where R&D measures are not currently using all planned EU funding, presupposes that even with emerging of bigger number of R&D projects – planned investment would be sufficient for both the strongest and newly appearing priorities;
8. Through scaling up of priorities "second" level priorities are not eliminated: they are integrated by updated keywords and it provides background for better implementation of R&D projects, aimed to achieve S3 goals.

It was decided to renew the list of corresponding technologies (as the previous one was from 2012) in the new priorities, although their titles/

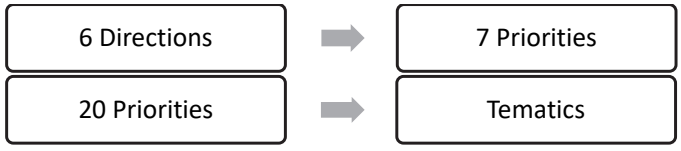


Figure 40 Smart Specialisation Simplification

designations remain almost the same. The further project selection should be based on the potential to address important problems/societal challenges rather than integrate priorities' specification. This will allow to receive more applications and encourage further cross-sectorial approaches.

After approval of updated Smart Specialisation strategy Programme, the unified and simplified S3 implementation Action plan was approved by the Ministry of Education, Science and Sport (Ministerial Order 30-08-2019 No.4- 498/V964, further – Action plan).

This Action plan was consolidated from 20 different roadmaps / action plans. In this version technical levels were excluded as technological descriptions tended to restrict the number of many companies able to participate in supporting schemes.

Strategy Process for Smart Specialisation in Lithuania

The Smart Specialisation strategy process in Lithuania is based on an initial analysis of the global and domestic challenges and evaluation of the national scientific and entrepreneurial potential. A revision was performed after a new investigation of the Lithuanian economy strengths and prospects for knowledge -driven growth. The process of preparation of the Programme has been framed by applying various different methods, such as analyses, fore- sight, surveys, and panel discussions.

At the end of 2018 year an Interim Evaluation of the Smart Specialisation Program Progress was carried out. After analysing the evaluation results and after assessing the potential future perspectives of the individual priorities, detailed conclusions were presented with recommendations and possible scenarios for further investments in the relevant areas, as well as the formulation of new thematic directions.

Taking into consideration the monitoring data of the Smart Specialisation strategy implementation, it was decided to abandon the logic of two-level hierarchy Smart Specialisation priorities and stay with the broader and more inclusive single level. Out of 6 priority areas and 20 priorities, 7 priorities were reformulated with the involvement of the economic discovery process (EDP) stakeholders. It was also decided to renew the list of corresponding technologies (as the previous one was from 2012) in the new priorities.

On the basis of the interim evaluation a revised version was prepared as an update of The Programme on the Implementation of the Priority Areas of Research and (Socio-Cultural) Development and Innovation (Smart Specialisation) and their Priorities. This update was approved on 24th July 2019 by the Resolution of the Government of the Republic of Lithuania No 760.

The main document related to Smart Specialisation in Lithuania is the Programme on the Implementation of the Priority Areas of Research and (Socio-Cultural) Development and Innovation (Smart Specialisation) and their Priorities was approved on the 30th of April 2014 by the Resolution of the Government of the Republic of Lithuania No 411 (the Programme). The strategic goal of the Programme is to increase the impact of high value added, knowledge-intensive and highly qualified labour-intensive economic activities on the GDP. This leads to structural changes of the economy by means of the RDI decisions. Specific RDI priorities have been identified within the research and (socio-cultural) development and innovation (Smart Specialisation) priority areas and the Programme formulates the provisions for the implementation thereof.

The Lithuanian RDI system is changing slowly with relation to the Smart Specialisation strategy and Lithuania is still expecting to achieve substantial changes to the landscape or performance of the RDI system. However, the Smart Specialisation strategy creation process has changed policy-making practices and stakeholder involvement. As Reimeris (2016) has noted this indicates that taking action towards the strategy rules of Smart Specialisation strategy development is itself a mechanism that leads to a level of change, even before the increase in the performance of the RDI system is realized.

Stakeholder Involvement in Lithuania

Technologies, such as Internet, have acted as pioneers in open innovation models, enabling the direct involvement of users and generating a cross-cutting impact on society as a whole. Lithuania is aware that Smart Specialisation strategy is based on open innovation model in which, besides companies, research and innovation stakeholders and public administrations, ordinary citizens, as the main beneficiaries and users of innovations, should also be present.

Accordingly, implementing Smart Specialisation strategies requires a step up from a triple-helix model (based on interaction between research and innovation stakeholders, the public administrations and companies) to a quadruple-helix innovation model in which ICT is the basic enabling technology and which includes users of products and services, placing them at the centre of the innovation process. Lithuania is committed to the quadruple helix model which involves research and innovation stakeholders that represent key local actors from government, research and scientific institutions, companies and citizens. The stakeholders engage in bottom-up collaborative processes of innovation, and in innovation policy making, and thereby challenge the traditional top-down policy making process. In the quadruple-helix innovation model promoted through the Smart Specialisation strategy concept, public administration is called to be one of the players and facilitate the stakeholders' active, cooperative roles in innovation processes. The process of preparation of the Programme has been framed by applying the method of Entrepreneurial discovery process (EDP) to foster the collective ownership and involve the stakeholders.

The implementation of the Smart Specialisation Programme in Lithuania is organized by the Ministry of Education, Science and Sport and the Ministry of Economy and Innovation (or their authorized institutions) and coordinated by the Coordination Group for the Implementation of the Research and Experimental (Social, Cultural) and Innovation Development Priorities (hereinafter referred to as the Coordination Group).

The Coordination Group consists of representatives of the Office of the Government of the Republic of Lithuania, the Ministry of Education, Science and Sport, the Ministry of Economy and Innovation, the Ministry of Finance of the Republic of Lithuania, other state institutions and socio-economic partners.

Implementation of the Joint Initiatives is organized according to the Provisions of the Joint Initiatives Procedure by the Agency for Science, Innovation and Technology – MITA. Implementation of the Smart Specialisation in Lithuania requires widest possible involvement of industry and science and education institutions. MITA is one of the main institutions, responsible for implementing joint projects for Smart Specialisation strategy and promoting the collaboration between businesses, science and education. As a governmental agency MITA organizes discussions on the implementation of the Programme and Individual RDI priority action plans applying a process that includes participants and other stakeholders from both public and private sectors.

MITA is responsible for the preparation of proposals to the stakeholders, organization of information seminars and partner search events, activities of collaboration between science and study institutions and other public and private entities in order to encourage their joint participation in the projects to be implemented under the study and RDI policy measures.

MITA also provides consulting to economic entities on the possibilities of applying the RDI results in the production of high value-added products. To ensure the quality of the results, MITA may hire experts competent in the relevant RDI priority areas for the implementation of the Agency 's activities (an

expert per area). Currently MITA is also ensuring the process of coordination of the group work in each Smart Specialisation strategy priority by allocating existing resources and expertise through various projects and budgetary means.

A good example about how citizens are involved in implementation of Smart Specialisation strategy is Implementation of Pilot initiatives, that are executed through with the help of Smart up BSR project. During 2019 two pilot projects were initiated and implemented, both aimed to attract citizens in the creation process of new technologies. During the International Port Technologies hackathon "Portathon Baltic 2019", that took place in September 2019, more than 80 participants from all Europe were working together to propose new ideas in the field of digitalization in logistics, automated port equipment, digital port terminals and smart port ecosystems.

Another Pilot project concentrates on encouraging citizens to take active role in the development of technologies related to safety and security. The Delta Navy Hackathon was organized on October 2019. Considering the specific maritime smart city topic, Delta Navy Hackathon was held in a Lithuanian Naval Force headquarters and supply ship "Jotvingis". With involvement of main stakeholders of maritime ecosystem, IT/engineering field qualified citizens, the organizers intended to take advantage of innovations to improve safety and living standard of the population by creating the following solutions:

- Personnel monitoring system;
- Laser communication;
- Search/environmental analysis drone (sea launch).

To summarize, the Smart Specialisation strategy process in Lithuania has created the possibility to enhance collaboration between working groups and also use tools of participation. The priority selection activity and the assessment and revision process of the Smart Specialisation strategy priorities has crystallized into a strategic and systematic work engaging government, the implementing agency MITA, the statistical analysis centre, and SMEs. Together these actors carry the potential of leveraging RIS3 towards an increased RDI activity that can restructure Lithuanian economy.

Monitoring Mechanisms of Lithuania

Smart Specialisation strategy is a large-scale public policy construct. The complexity of the strategy also leads to a complex and difficult process of monitoring.

The monitoring and assessment of the implementation of Smart Specialisation strategy in Lithuania, including the RDI priorities and the RDI priority action plans, is organized by the Government Strategic Analysis Centre – STRATA (previously MOSTA – Centre for Research and Higher Education Monitoring and Analysis). This Governmental organisation is responsible for the compilation of data on the monitoring, ongoing analysis and assessment, summarization of the data, and its timely submission to the Coordination Group and other stakeholders as well as for the provision of information intended for publication. In order to perform its functions STRATA may attract additional competences of Lithuanian and/or foreign experts.

STRATA is constantly looking forward for insights and observations on how the monitoring methodology could be improved, or what could be added for a more precise assessment of the situation and its changes. This organisation is responsible to organize an interim assessment of each RDI priority action plan upon expiry of two years of approval of such plan. On completion of the Programme, STRATA will organize the final assessment of implementation of each RDI priority action plan. Based on the interim assessment results, STRATA is obliged to submit its report to the Coordination Group with well-grounded proposals and recommendations for further action related to the developing the Programme and/or individual RDI priority action plans.

SHOWCASE: Klaipėda – From Regional to National Smart Specialisation Strategy

Klaipėda region includes 7 municipalities: the cities of Klaipėda, Palanga and Neringa, as well as the municipalities of Klaipėda, Šilutė, Kretinga,

and Skuodas districts. Klaipėda region itself has no Smart Specialisation strategy – it is part of Lithuanian national Smart Specialisation strategy – thus, the region always needs to ensure that its interests are reflected in the national strategy, which is also a framework document for the governmental investments.

Smart Specialisation is an important factor that integrates all areas of government, policy makers and business representatives from all areas of the regional development. It is clear that the development and growth of the region cannot be achieved without Smart Specialisation. Klaipėda municipality approved in 2019 the Klaipėda Economic Development Strategy 2030. All innovation ecosystem participants were involved and they are committed to achieve the Klaipėda region's goals – to attract new technology providers, talents, technology transfer agreements, establish attractive business environment.

Klaipėda Smart Specialisation Strategy

The preparation of the strategy of economic development of Klaipėda for 2030 was initiated in 2018. The integration of the Smart Specialisation priorities of Klaipėda region was agreed during the analysis of these directions with the interested groups. As a result, the representatives of Klaipėda Science and Technology Park initiated meetings with the representatives of individual thematic groups of Smart Specialisation strategy, and presented the innovation needs of Klaipėda region:

1. Transport and logistics:
   - Design of clean vehicles;
   - Digitalization and development of new technological solutions, their integration and unification (towards efficiency and safety at work and in production)
   - The appearance of the transport logistics (maritime-oriented) unit (faculty/institute, etc.) at Klaipėda University.
2. Industry 4.0:
   - Creation and development of the competence centres in the logistics sector;
   - Design and development of the autonomous port systems and logistics solutions;
   - Storage and processing of the "Big data".
3. Energy:
   - Exploitation of geothermal energy potential;
   - A perspective for the development of the offshore wind farms;
   - Wider use of LNG.

The region's innovation strategy is not possible without the breakthrough of the industry in these two areas:

- New processes, materials and technologies of manufacturing
- ICT – development, i.e. new business process management models focused on the creation of added value in production.

Both areas include digitalization of industry based on automatization, cloud computing, internet of things, big data, system integration. The Klaipėda region proposes to retain the priorities of the Smart Specialisation strategy in the current version, as they have the potential to deploy e-solutions, big data, cybersecurity and other solutions in industry through the efforts of the private and non-governmental sectors.

Klaipėda Smart Specialisation Process

When Lithuania was preparing the direction of the Smart Specialisation strategy and approving its priorities in 2015, meetings were organized with various work groups and surveys were conducted. The representatives of business and government of Klaipėda region were also invited to joint these groups. While Klaipėda region had not yet identified its Specialisation at that time, the city of Klaipėda had prepared the strategic plan of the city for 2013-2020. The following priorities have been stipulated in this plan:

- Creation of the environment favourable to the development of industry, business and knowledge economy;
- Development of sustainable infrastructure;
- Development of the port city;
- Improvement of the living conditions and strengthening of social security;
- Development of education and culture.

As the year of 2017 progressed, active discussions on the importance of defining the directions of the Smart Specialisation strategy of Klaipėda region were conducted, as well as the process of priorities identification was started. Klaipėda Science and Technology Park together collaborated with the partner of the project Smart-up BSR Interreg project, the Association of Klaipėda Region Municipalities. In order to define the Smart Specialisation strategy of the Klaipėda region they invited the representatives of Klaipėda region municipalities, business, and science to the discussion. Each municipality as well as its specialisation were analysed during the process resulting in these groupings:

- Klaipėda city is heavily specialized in industry. The foundation of the region is transport and storage. The ice-free port is used by many export-oriented Lithuanian companies and it creates conditions for the establishment of highly competitive manufacturing industries in the region.

- The city also specializes in transport and the manufacture of equipment, and this concentration is growing. There are several large shipyards, dockyards of yachts and water structures in the city. The region is also specialized in furniture manufacturing – the companies established in the city include woodworking, preparation of intermediate wood production as well as furniture assembly.

- In recent years, the specialisation in the chemical industry emerged in Klaipėda district municipality. Klaipėda district has a strong specialisation in the sectors of construction, wood and furniture production. Land transport is greatly developed – many companies providing cargo transportation and storage services are established in Klaipėda region.

- Most of the economic activities in Kretinga district is generated by a longer chain – in non-locally focused activities. This leads to a broad spectrum of sectors falling within the definition of the specialisation. One of the emphasized specialisations – the region has a strong forestry – is the wood products value chain. The sector of furniture manufacturing is also present, though no large cluster has yet formed. Kretinga also has specialized on metalworking.

- The main specialisation of Palanga and Neringa cities is tourism and catering.

- Šilutė district has several strong industrial specialisations. One of them is furniture manufacturing; several large factories operate in the region. Wind energy is being developed as well. The region also specializes in lower value-added sectors, such as agriculture, tourism and catering, as well as constructions.

- Skuodas district is poorly specialized – most of the economic activities in the region are generated by a short chain – in locally focused activities.

In terms of a Smart Specialisation strategy these groupings are portraying a lot of variety and need to be strategically re-evaluated to create sustainable Smart Specialisation choices that benefit each municipality locally and the region as a whole.

Also, it is important to mention that Klaipėda Port has a big influence for all Klaipėda region. Currently the EU is still leading the Maritime development globally, and the challenge for the regions like Klaipeda is to find the way to benefit on being frontrunners in application of the technologies, gaining enough knowledge and capacity to transform local Maritime industries to a higher added value products and services. Growing from port cargo handling company to equipment

producer, shipyards stepping into the autonomous shipping technology suppliers is of high importance.

Klaipėda Port challenges were analysed in organized Smart-up Innovation camp in Palanga (Lithuania, June 13-15, 2018). Klaipėda Science and Technology Park were happy to receive ideas from workshop groups for how to solve Klaipėda Port challenges and it was decided to generate a pilot that would generate new ideas and solutions for port authority, companies who perform in ports and the entire port community. It was set the main task for the pilot - to analyse the current situation of ports, their challenges, the technologies applied in the port and generate ideas, prototypes, solutions for port digitization and automation processes with the help of target groups. It was decided that the best type for pilot is Hackathon – this is a 48 hours marathon, where participants (port authority representatives, companies, experts, scientists, municipality representatives) and teams pitching their ideas and inviting other participants to join and work on idea/prototype together.

Four meetings were organized that resulted in the formulation and approval of a general direction towards marine and maritime sustainable growth, listed as the Blue Growth of the Klaipėda region (Table 12).

Klaipėda Smart Specialisation Priorities

In the Klaipėda Economic Development Strategy 2030, approved in 2019, these priority axes are foreseen:

- Marine economy (integrated complex: port, logistics, industry; LNG cluster; maritime and health promotion tourism);
- Bio economy (Bio-economy cluster: for chemistry, timber, biotechnology businesses, education institutions; blue technologies; renewable energy);
- Economics of the advanced industry ("Pramonės 4.0"- competence centre);
- Creative and service economy (service centres; creative industry cluster; MICE (business, conference tourism).

These axes are reflected in the current Lithuanian Smart Specialisation strategy at national level. All of the approved Smart Specialisation directions correlate with the directions and priorities of the Klaipėda region.

Transport and logistics are one of the priority directions of the Smart Specialisation strategy directions of Klaipėda region both in the initial and current Smart Specialisation strategy. This is due to the seaport and the well-developed logistics network in Klaipėda. While implementing the Smart Specialisation strategy, the integration of different transport chains and the technologies of clean transport creation are of particular importance. The main challenge in the Klaipėda region is to strengthen the development and integration of the transport sector, which would create a complete chain of services. To this end, it seeks to integrate the potential of all municipalities, research institutions and businesses in the region and to have a consensus to reach the breakthrough.

While analysing the priority of transportation, the creation of smart and clean (low emission) vehicles plays an important part in the strategic direction of the Klaipėda region. A fruitful connection to the potential of the transport and energy sectors in enhancing ecological aspects and clean fuel is also apparent. For example, the use of the liquefied natural gas (LNG) as a fuel is important as a transitional type of fuel – this is the niche and the opportunity for the region.

Klaipėda region aims to implement the scientific research and experimental development (SRED) projects in the transportation priority axis, and create and test smart transport systems and technologies, by using not only the LNG, but also the liquefied biogas (LBG). The development of the environmentally friendly vehicles, clean and smart transport - these directions were proposed to be incorporated into the currently revised Smart Specialisation strategy.

The Smart Specialisation approach offers the quadruple helix model as a base for more open collaboration. In addition to the priorities above the Klaipėda working group discussing the regional process outlined the key questions to be addressed by the roadmap for building a smart city:

Table 12 General Direction of Blue Growth of Klaipėda

MARINE ECONOMICS	BIO-ECONOMICS	CREATIVE AND SERVICE ECONOMICS	ADVANCED INDUSTRIAL ECONOMICS	SUSTAINABLE COASTAL AND MARINE TOURISM	INNOVATIVE ORGANIC AGRICULTURE
Integrated port logistics industry complex. Development of LNG technology and its use.	Production of innovative bio-products. Production and use of renewable energy. Recycling of biomass and waste. Development of biotechnology and its application in the aquaculture.	Development and application of digital solutions in logistics, transport and industry. Centres of professional services. Summer Bureau of Lithuanian and foreign business.	Production of high value-added electrical equipment, vehicles. Development and application of automation solutions in logistics, transport and industry.	Health promotion (use of resort resources) and recreation. Cruise tourism. Active tourism. MICE tourism.	Resource-efficient fisheries. Agro-innovation focused on the development and processing of innovative raw materials.

- What is a smart city in practice?
- What are the indicators for measuring "smartness" and progress?
- How can a smart sustainable city ensure well-being of its inhabitants?

The results of the working group focus on developing several key elements of smart cities:

- platforms for citizen participation;
- innovation units for rapid experimenting;
- communication strategy to overcome the divide between the stakeholders.

Extending Smart Specialization Strategy to Western Lithuania

Upon submitting a proposal to the Smart Specialisation strategy of the Klaipėda region aimed to emphasize a meeting was organized with the transport and logistics coordinator to present the main goals, interests and positions in this sector in Western Lithuania. This included the implementation of the systems of autonomous ports, creation and development of logistics solutions ports, and digitalization. The representatives of wider Klaipėda region will benefit from the advantages in this field – the port, the logistics service network and the higher education institutions preparing the specialists.

Another direction, that is very important to the region of Western Lithuania, focuses on energetics and sustainable environment. One of the exclusive sources of renewable energy in Klaipėda region is the wind. Feasibility studies regarding the potential of wind turbines in the region have been carried out. The region discusses the creation of the "offshore" wind turbine park and its added value. This marks the distinctiveness of the region within the national context. There are also possibilities of developing other energy industries – wave energetics, ocean energetics technologies floating solar power stations and etc. The Western region of Lithuania has not yet taken full advantage of the geothermic energy – this is also one of the aims of the region in developing the Smart Specialization Strategy. In conclusion, it needs to be emphasized that the actual theme of the Smart Specialisation strategy in the priority of "Energetics and Sustainable Environment" is the creation of additional products in alternative energy.

Health technologies and biotechnology is a relevant priority to the region of Western Lithuania

– here a great potential exists both for the scientific expertise (Klaipėda University) and for the business side. Business and academia can jointly develop and implement new technological solutions of diagnostics for rehabilitation and therapy services. It is extremely important that the currently revised Smart Specialisation strategy (2020 – 2030) retain the theme of "The Advanced Applied Technologies for Personal and Public Health" and the theme specificity of this priority.

For the Klaipėda region it has also been important to retain the priority of "An Inclusive and Creative Society" in the Smart Specialisation strategy, because of the great potential of the creative industries, through which non-technological innovations can be promoted and developed. The Klaipėda region aims for cultural innovations, especially endorsing creative innovations related to social and cultural development. Upon implementing this priority, Klaipėda also seeks to focus on collaborative and blended learning technologies.

It is essential for the Klaipėda region to ensure an effective communication with its educational institutions, to be able to form a clear understanding of the ongoing processes in technology and the future needs of specialists, and constantly changing prerequisite for the competences of the future (i.e. STEM learning in early education). This is a crucial necessity in the whole of West Lithuania, and especially the industry and businesses in the wider territory around Klaipėda.

Concluding Remarks

Smart Specialisation in Lithuania is still on its way to work towards the set strategic goals. Lithuania aims to increase the impact on GDP and expand the share in the GDP of high value added, knowledge-intensive and highly qualified labour-intensive economic activities, which are to be reached by structural changes of the economy.

The main objectives that have to be achieved cover creation of innovative technologies, products, processes and/or methods. Using the outputs of these activities will allow Lithuania to respond to global trends and long-term national challenges. However, there is also a need to concentrate on an increase of competitiveness of Lithuania's legal entities, and therefore to help in achieving an upturn of opportunities in global markets – the focus is therefor on the commercialisation of knowledge created through the implementation of the Priorities.

Smart Specialisation slowly turns into a leverage to change the culture of the RDI policy making in Lithuania, thanks to the strong analytical homework required and a higher factual level of justifying decisions. Smart Specialization is therefore expected to have long-lasting effects on evidence-based policy making as well.

Development and implementation of Smart Specialisation strategy has initiated an analytical approach to RDI policy cycle and a several projects/tools/practices/etc. It also provided transparency and accountability, interactive monitoring systems, and constant sharing of good practices and solutions.

The level of Lithuanian innovation, digital competitiveness and industry productivity is rising, but the progress is not enough. In order to reach the ambitious goals, documented in the strategic documents, Lithuania needs to cope with challenges associated with the low level of innovative capacity, not sufficient investment in R&D, technology and innovations, weak integration into global value chains and unattractive research systems as well as quite sluggish digitization.

Lithuania Smart SpecialisationStrategy Analysis

Below follows an analysis of the Lithuania Smart Specialisation strategy presented through the lens of the Regional Strategy Diamond.

Strategy Formulation - What we Say

The Smart Specialisation Strategic programme in Lithuania consists of state support for RDI (research for development and innovation) through the integration of Smart Specialisation strategy with their regional and national programme. The attention of the Lithuania Smart Specialisation strategy is on achieving a high value-added, knowledge intensive economy by setting three objectives: increase the number of Smart new

innovative enterprises and accelerate technological modernization; increase business-science collaboration; promote integration of national and international research infrastructure. The revision of the Smart Specialisation strategy has focused on clarity. The previously broad Smart Specialisation strategy priorities are currently defined by applying a simplified strategy formulation.

Strategy Actions - What we Do

The scheme of EU-funding Policy Mix focussing on RDI and on medium-sized businesses is defined to support the strategy. By applying the simplified strategy and priority formulation the intent is to activate structural changes and RDI related decisions.

In order to facilitate action, the strategic priorities simplification has been introduced after the initial assessment. The update condenses six high level priorities and 20 sub-level priorities into seven clearly formulated and re-adjusted priorities that are easier to act upon. Chains of relevance are established. Follow-up meetings are taking place and the simplification process allows evaluations to be performed dependably. Monitoring and assessment are systematically performed. Interim evaluation is applied and used for clarifying goals and priorities.

Pilots are established as tools for involvement in quadruple helix fashion. The Klaipėda Region with the Port and the maritime ecosystem are activated through targeted pilots and by specifically aligning Smart Specialisation and national strategy.

Strategic Competences - What we Have

Funding and organizing as well as monitoring and evaluating entities are in place and functional. A Coordination Group is established consisting of representatives of the Office of the Government of the Republic of Lithuania, the Ministry of Education, Science and Sport, the Ministry of Economy and Innovation, the Ministry of Finance of the Republic of Lithuania, other state institutions and socio-economic partners. The Agency of Science, Innovation and Technology – MITA is in charge of organizing strategic projects for the implementation of RIS3. MITA has been assigned to secure wide involvement of business, science and educational institutions. The efficiency in driving initiatives through will depend on the responsiveness of MITA's wide network in applying the proposed measures. Monitoring and assessment are actively provided to the Coordination Group and its stakeholders as well as the Government strategic Analysis Centre – STRATA. At regional level in the case of Klaipėda region the Science and Technology Park is active in defining the Smart Specialisation strategy priorities as an entity with the competence to act close to the businesses that are involved in the specific thematic groups.

The advantages that the Klaipėda region has in the transport and logistics sector are recognized. Competences, knowledge and skills are available through the operations of the port, the logistics service network, and the higher education institutions responsible for the training of specialists. An additional source of competence is related to the exclusive energy creation through wind power.

Strategic Competing - How we Win

Competitiveness is achieved through strengthening development and integration within the framework of specific sectors. This allows to create a complete chain of services in the sector and if necessary, across sectors. To this end the Smart Specialisation strategy seeks to integrate the potential of all municipalities, research institutions and businesses in the region in specific sectors.

Winning would mean to reach a consensus for the breakthrough, an integration of regional and national actions. It would also mean to leverage on the available potentials in transport and logistics as well as in renewable energy taking full advantage of the distinctiveness of the regions, as for example the port in Klaipėda and energy technologies in the Western region. While a large spectrum of possibilities presents itself based on the potentials linked to higher education outputs, Lithuania's RIS3 emphasises a cross-sectorial, multi-perspective approach that uses collaborative and blended

learning processes to constantly adapt to the changing need of competences.

Strategy Leadership - How we Lead

Considering the breadth of the priorities envisioned for the breakthrough the way to lead is through maintaining the direction in sight while navigating through the multi-focal strategy. This implies carefully conducting discussions that question and re-confirm the choices and assess their potential.

The main focus for this process of dialogues for revision includes considering the amount and scope of priorities and to take into account the horizontal priorities with largest impact, regardless of their sector. It is worth to reflect on the capacity of each priority and whether they should have equal attention, thus deciding on the ones that make the biggest impact.

Finally, a decision needs to be reached on how to collaboratively set the implementation mechanisms on a coordinated path. This process needs to be based on continued engagement of science and business and on coordination of science-business collaboration. Leading by conducting interim evaluations that give opportunity to adjust priorities and integrate skills during the RIS3 implementation process.

Analysis Summary of Lithuania

To summarize, the strategy story of Lithuania is approached through the perspective of achieving balance between the 5 angles of the Regional Strategy Diamond. The visualization allows to position the successful actions and the identified bottlenecks (in red). Each of the dimensions in the Regional Strategy Diamond affects the other dimensions in both positive and negative results. In order to achieve economic transformation, the movement from and towards the angles, inwards and outwards needs to be in constant balance.

Lithuania's strategy diamond shows a certain balance of positive elements across all angles at the same time as bottlenecks in each angle can displace the balance. This reflects the successes that have been achieved through the strategy work.

At first the strategy was set out too broadly, but the revision process set the direction towards more focus, which still needs to be sharpened. In the leadership angle a big step was taken by establishing a clearly defined coordination agency. This is a strength that also affects positively the competences angle and the actions angle. MITA, as the responsible agency, will be a key element in maintaining the balance between the angles.

Looking at each angle's weaknesses, long-term threats can be identified which could undermine the already achieved successes. As in each angle there is a call towards prioritising and focus, solving the bottlenecks seems to be linked to the yet to be defined strategic direction. An additional step forward towards increased focus through strategy revision is still needed. It would provide a path for more targeted actions in each angle and the possibility to leverage what has been developed.

Strategy

- Strategy and priorities simplified
- Focus needed

Actions

- Logistics and Industry
- Plenty of actions in several directions

Competitiveness

- High education in capital region
- Port and logistics, Klaipeda
- Innovation as the backbone of the Lithuanian economy

Competences

- MITA's expertise in strategy
- Brain drain, aging population
- Developing skills for smart specialisation industrial transition and entrepreneurship

Culture and Leadership

- MITA has been delegated with the coordination of all players in innovation strategy work and implementation
- Higher education and other institutions isolated

Figure 41 Strategy Diamond of Lithuania

3.11 POLAND, GDANSK/POMORSKIE REGION – Poland's Shining Star

The Metropolitan Area of Gdansk-Gdynia-Sopot is the largest and the fastest-growing metropolitan area in northern Poland, it is located in the Pomorskie Region, near the Bay of Gdańsk. It is inhabited by more than 1.5 m citizens in 57 municipalities. It is one of two metropolises with the fastest population increase, according to Statistics Poland (Główny Urząd Statystyczny) predictions. The two biggest cities in the metropolitan area are Gdańsk and Gdynia. Since 2011 the 57 municipalities have organised themselves by establishing a bottom-up association called Metropolitan Area of Gdansk-Gdynia-Sopot (Obszar Metropolitalny Gdańsk-Gdynia-Sopot) with the aim to strengthen cooperation and to achieve the sustainable development of the entire metropolitan area around Gdansk. The task of the association is making the best use of the potential of the member cities and municipalities, while at the same time respecting their differences and unique idiosyncrasies.

There is also a macro-regional aspect to the Gdansk-Gdynia-Sopot Metropolitan Area as it also is a significant centre of integration processes within the Baltic Sea region (BSR). One cross-regional element that plays an important role is providing a key link in the BSR transport chain, linking the north and west of Europe with central and southern Europe. The international importance of the Gdansk-Gdynia-Sopot Metropolitan Area is also shown by the ever-expanding network of air connections available from Gdansk Lech Walesa Airport, and by the number of international corporations or local companies which have invested abroad. This importance is also demonstrated by the number of international agreements signed among universities, the increasing number of foreign students, and the number of joint research projects.

Regional Key Indicators of the Pomorskie Region

The Pomorskie region and its innovation context for the Smart Specialisation strategy is introduced with a short analysis of the Pomorskie region's Regional Innovation Index (RII). The two graphs below present the RII development between 2011-2019 (Figure 42) and the breakdown of the RII dimensions (Figure 43). The dimensions listed in the table constitute the RIS profile of indicators in order of performance for 2019 with reference to 2011. Six out of the 17 dimensions that have significance for Innovation through Smart Specialisation strategy are reproduced in Annex II for a fuller picture of the development of the region with regard to those specific dimensions over the years 2011, 2013, 2015, 2017, and 2019. A general summary of the regional macro-economic indicators is attached at the end of the Gdansk / Pomorskie strategy story.

The RII of Pomorskie 2019 (relative to EU-28 in 2011) is: Moderate. With a ranking of 57.7 Pomorskie is in the subgroup of Moderate Innovator –. Pomorskie is among the Polish regions that record an increase in performance though not among those with highest increase. The difference in performance between 2011 and 2019 is 5.3.

The trend since 2013 shows that there is a steady increase. The results between 2017 and 2019 especially indicate that there are significant changes happening in terms of leading the country towards a higher participation in the innovation capacity of the Baltic Sea Region.

The table to the right lists the dimensions that constitute the RII in order of performance, illustrating the most significant changes since 2011.

Population with tertiary education clearly stands out as having the biggest impact, followed by Employment in medium and high-tech manufacturing and knowledge intensive services. Among the top five on the list we find Non-R&D Innovation Expenditures, R&D Expenditures business sector, and Trademark applications, all of which indicate changes in the innovation environment including technology related activities within companies. Indicators relating to connectivity such as SMEs collaborating with others have undergone minimal changes. Also, Life-long learning is among the indicators with least increase in contrast to some of the high innovation performers in BSR listing a high increase in life-long learning activities.

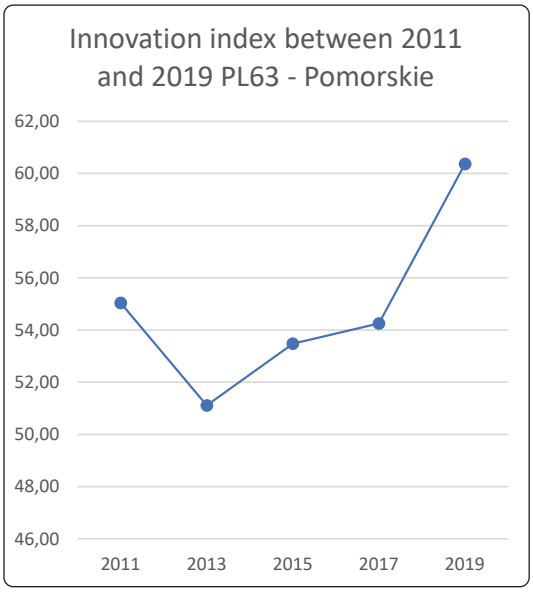


Figure 42 RII of Pomorskie 2011-2019

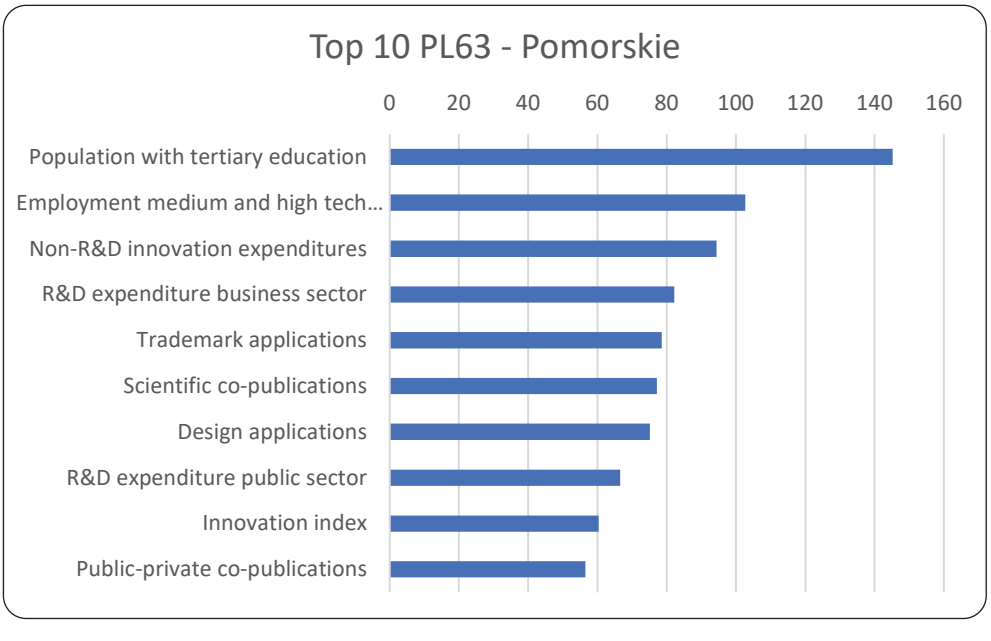


Figure 43 Pomorskie Profile According to the 17 RIS Indicators

In the detailed charts considerable movement can be observed over time. For example, Innovative companies collaborating with others is surprisingly starting at a high level in 2011 and then decreased sharply. Collaboration is now slowly on the rise since 2015. R&D Public expenditures show a sharp rise followed by a sharp decline around 2015 while R&D business expenditures show a constant rise. Another indicator showing sharp decline and rise around 2015 is SMEs innovating in-house. Non-R&D expenditures show a sharp increase in 2015 followed by an equally sharp decline in 2017.

The variation and fluctuation of the indicators may signal a search for appropriate policy mechanisms with frequent re-adjustments. Given the fact that the figures are based on a 1-2-years lag, measures taken between 2013 and 2015 could be behind the fluctuations following in 2017 and 2019. Overall however, the Pomorskie region shows an increase in performance with reference to 2011 which has a good chance of being maintained and increased as a result of implementing Smart Specialisation in the region and by applying a rigourous monitoring of the outcomes of its implementation.

Smart Specialisation strategy in the Gdansk / Pomorskie Region

As stated in the Smart Specialisation document (2017) in accordance with the Smart Specialisation strategy principle, public intervention concentrates on enabling and utilising potentials relevant to the region by selecting smart specialisations. The goal has been to specify the scope of Smart Specialisation areas, concentrate efforts on the most attractive and prospective segments (development directions), and facilitate the assessment of R&D and innovative projects applying for financing under operational programmes utilising EU funds. (Pomorskie Smart Specialisations introduction, 2017)

The Pomorskie Regional Development Strategy according to the Smart Specialisation principle as generated by the Self-Government of the Pomorskie Region was also transposed into the provisions of the "Pomorskie Creativity Port" Regional Strategic Programme (RSP) for Economic Development and the Regional Operational Programme for the Pomorskie Voivodeship for the years 2014-2020 (ROP PV). In accordance with those provisions, development enterprises falling within the areas of Pomorskie Smart Specialisations (PSSs) are prioritised when granting financial support for research and development during the programming period of 2014-2020.

The Self-Government of the Pomorskie Region supports the development of PSSs on many levels. For example, it entered into negotiations with Partnerships representing areas of Pomorskie Smart Specialisations, which led to the conclusion of Agreements on Pomorskie Smart Specialisations on 28 January 2016.

Priority Areas and Spearheads for the Pomorskie Region

In April 2015, the Voivodeship Board chose four priorities, Pomorskie Smart Specialisations (PSS):

Agreements on the Smart Specialisations – signed between Pomorskie Voivodeship and Partnerships representing the four areas of the Pomorskie Smart Specialisations – specified the scope of PSS areas, research directions and so called horizontal projects which are relevant for the development of the PSS as a strategic partnership as a whole and which may be given preference in access to finance within the framework of the Regional Operational Programme of Pomorskie Voivodship 2014–2020 or support in applying for financing at the national level. The idea behind horizontal projects is to create an adequate critical mass of human and financial capital aimed at implementation of development investments in the specialisations.

Based on the Smart Specialisation priority areas thematic groups and establishment of consortia in strategic themes for the future of the region were created:

- (PSS1) Pomorskie Platform of Autonomous Ships – at the beginning of 2019 an informal working group called Pomorskie Autonomous Ship Platform interested in the subject of ship autonomy was created with the initiative of local government and stakeholders gathered around smart maritime Specialisation.

- (PSS2) Regional innovation centre dedicated to the application of space and satellite technologies in the maritime economy – the Marshal's Office initiated the development of a cooperation model and the creation of an innovation centre in the region dedicated to the use of space and satellite technologies in the maritime economy. The centre focuses on the possibilities of using space and satellite technologies in various economic zones and in everyday life, based on, among other enablers that allow you to combine satellite data with Internet of Things (IoT) solutions. Regional partners are involved in the organization of the centre, including Polish Space Agency, Gdańsk University of Technology, Maritime PSS and ICT PSS.
- (PSS3) Initiative to create the Polish Hydrogen Valley – a letter of intent was signed in this matter between the Pomorskie Voivodeship, the Cluster of Hydrogen Technology and Clean Coal Technologies, PKP Energetyka, the City of Gdynia, the Gdańsk-Gdynia-Sopot Metropolitan Area, and the PSS1 and PSS3 Councils. The goal of the initiative is to build the Pomorskie Hydrogen Valley, enabling the use of potential in the production of hydrogen fuels and ensuring their use, in particular in transport applications.
- (PSS4): Digital Health Care – Pomorskie Voivodeship together with Copernicus hospital and the Interizon Foundation joined the cooperation in the "inDemand" project from September 2018 to August 2020. The project promotes a cooperation model consisting in solving problems of healthcare institutions using new technologies. The project involves external companies that co-create digital solutions using public funds. The model has been developed and is currently being implemented in three EU pilot regions: Murcia (Spain), Oulu (Finland) and Paris (France).

Revisiting the Gdansk / Pomorskie Smart Specialisation Strategy

In 2018, as regards the Smart Specialisation strategy priority areas, the scopes were reviewed and updated. With the analysis carried out (by Deloitte and OECD in 2017 and 2018) and the recommendations of the PSS Councils, it was decided that the PSS areas were approved without changes. At the same time there are some activities related to PSS animation and strengthening cross-sectoral cooperation that are recommended:

- Animating cooperation aimed at creating innovative projects (launching of the project for animating the development of PSS and clusters)
- Complementarity and diversity of the financial offer (all-in-one-process)
- Creating platforms, cooperation networks - and enabling access to know-how
- Observation of global trends (practical tools, models, PSS monitoring)
- Expert support tailored to the needs of the business environment
- Stronger involvement of the higher education institutions (using its potential)

Off-shore, port and logistics technologies which will foster on the economically effective and environmentally safe exploration and exploitation of maritime resources	**Interactive technologies in an information-saturated environment** which will improve the effectiveness and security of various human activities in the economic and social sphere
Eco-effective technologies in the generation, transmission, distribution and consumption of energy and fuels and in construction which will contribute to decreased energy consumption of the economy and lower its negative impact on the environment.	**Medical technologies in the area of civilization and ageing-associated diseases** which will contribute to the reduction of social and economic costs of civilization and ageing-associated diseases

Table 13 Pomorskie Smart Specialisation Priorities

In 2019, the Strategy of Pomorskie update process began. In 2020 Regional Strategic Programs will also be updated, including the "Pomeranian Port of Creativity", which represent the RIS3 Strategy in the Pomorskie region. However, as a result of the analyses and decisions of the PSS Councils, the four areas of the Pomorskie Smart Specialisation remain unchanged.[28]

Strategy Process of Smart Specialisation for the Pomorskie Region

In response to the requirements specified by the European Union in relation to the selection of Smart Specialisation, the Self-Government of the Pomorskie Region has initiated a process leading to their identification. The process began in 2011 with the updating of the Pomorskie Regional Development Strategy. As a result, the Smart Specialisation principle was included in the Strategy as one of the key principles for its implementation.

The Pomorskie Region has adopted a bottom-up approach to defining smart specialisations. The approach has consisted in inviting business and scientific circles, organised into partnerships and interested in developing specific specialisations, to submit concrete proposals under the Call for proposals for the selection of Pomorskie Smart Specialisations. The regional authorities selected proposals with the highest development potential among those submitted. The process of selecting PSSs was carried out with the involvement of independent experts comprising the Selection Board, in the period between 14 May and 20 November 2014.

The proposals for smart specialisations were assessed through the prism of the following criteria:

- Challenges, tendencies, potential market
- Economic and technological potential
- Benchmarking (domestic and international)
- Strategy and action plan
- Partnership and activities undertaken thus far in support of the development of specialisations

The Agreements with the Pomorskie Voivodeship, in which the scope of individual PPSs was clarified were signed in January 2016 by the entities identifying with the chosen Smart Specialisation priorities. Under the Agreements on PSSs, Councils of PSSs were chosen from among the signatories. They constitute a "channel of communication" between the business, scientific sectors and the administration with regard to any activities within the given area of PSS. Pomorskie Smart Specialisation's Councils – created for each specialisation in order to organise permanent dialogue between entities operating under smart specialisations and regional government determine the direction of specialisation development and take measures to strengthen the area of PSSs (see footnote 18).

In January 2019 the Second Agreements were signed. Support of the four Smart Specialisation priorities areas determine the main axis of activities of the Innovation Development Department of the Economic Development Department in the Marshal's Office of the Pomeranian Voivodeship.

Stakeholders Involvement in the Pomorskie Region

The process of identifying PSSs was carried out in six steps involving negotiations with stakeholders:

- STEP 1 – Reviewing and supplementing analyses concerning the region's economic profile to specify its characteristic (endogenous) resources, advantages, development barriers,

28 K.Lipińska, Pomorskie region, Aarhus 2018, Peer to peer review session on Innovation Camp https://s3platform.jrc.ec.europa.eu/-/peer-exchange-and-learning-pxl-workshop-on-entrepreneurial-discovery-process-edp-policy-instruments-and-monitoring?inheritRedirect=true

and economic activity areas with high growth potential.

- STEP 2 – Inviting circles that identify with the issue of development of the above-mentioned economic activity areas to present initial proposals for smart specialisations and actions aimed at strengthening their potential and improving the region's competitive position in the call for proposals (first stage of the Call for Proposals).
- STEP 3 – Presenting the submitted initial concepts and reviewing (analysing) them with the involvement of the Selection Board.
- STEP 4 – Inviting the Partnerships preparing initial applications to present final concepts of smart specialisations (second stage of the Call for Proposals).
- STEP 5 – Negotiations of the Board of the Pomorskie Region with PPSs Partnerships. The negotiations between the PSSs Partnerships and the Self-Government of the Pomorskie Region also led to agreeing on specific undertakings (so-called horizontal projects).
- STEP 6 – Concluding Agreements on Pomorskie Smart Specialisations between the Partnerships and the Board of the Pomorskie Region.

Comprehensive activities under the "Smart Progress" Project also indirectly contribute to citizen involvement in the subject of innovation and increase the society's impact on the created new solutions tailored to their needs.

As part of the "Smart progress" project, actions are taken to organize competence development centres that will appear in critical areas of diagnosed competence deficits and will support existing and creation of new competences in the area of PSS. The project also anticipates activities related to entrepreneurship learning, which is necessary to stimulate the creation of new, innovative start-ups and to support entrepreneurial skills and attitudes among young people, who are future employees' potential for entities from the PSS. Activities will be conducted on the basis of cooperation with universities and academic business incubators, career offices, etc. To ensure continuity of activities and effects for the future, it is also necessary to support the academic staff educating students in topics related to entrepreneurship.

Perspectives to Smart Specialisation Strategy from the Implementing Partners Point of View

The Metropolitan Area is an association of over 50 municipalities and cities. As part of the association, we work with our municipalities mainly through the Thematic Commissions. One of the Commissions is the Strategy Commission, which is responsible for an input for the strategy in the area of the Metropolitan Subregion. Work on the report and diagnosis lasted for several months in 2019. Also, as a broker institution in the Integrated Territorial Investment (ITI) instrument, we are a part of the implementation system of the Regional Operational Program in the Pomeranian Voivodeship.

In the Smart Up project, we have undertaken cooperation with the Pomeranian Region from the very beginning, in particular with the Economic Development Department, which is responsible for the implementation of PSS in the region. One of the challenges we worked on during the Camp referred directly to PSS1 (maritime and logistics). The question was: how cities can cooperate with ports, as well as how new technologies can support inhabitants of port areas. All the InnoCamp challenges were related to the quadruple helix model in local metropolitan policies

Monitoring Mechanisms in the Pomorskie Region

The region has set up a mechanism to support Smart Specialisation strategy implementation and monitories by means of a multi-functional orchestrating project: "Smart Progress - Animation of the development of areas of Pomorskie Smart Specialisation as part of the Entrepreneurial Discovery Process". This project is implemented by the Economic Development Department of the Marshal's Office of the Pomorskie Voivodeship from the funds of the Regional Operational Program of the Pomorskie Voivodeship for 2014-2020.

"Smart Progress" responds to the challenges emerging in the Pomorskie Innovation support system. The aim of the project is to increase the activity of entities (companies, scientific units, etc.) from the PSS areas through, among others creating specific thematic consortia around business ideas based on new technologies, looking for new ways to provide personnel for industries related to PSS, establishing international business relationships in which Pomorskie companies would act not only as subcontractors and consumers of other people's technological solutions but also suppliers own technologies. The subject of the project is also building a brand of Pomorskie business specialities, recognized on a national and international scale. The project's initiatives are focused on the following animation activities:

- The Process of Entrepreneurial Discovery – includes: continuation of the process of entrepreneurial discovery, which in particular will focus on verification and deepening of existing and possibly discovering new innovative areas with high development potential, identification of projects and R&D projects in response to market needs (serving development new products and technologies), stimulating and animating cooperation between regional partners and the effective use of R&D support tools.

- Internationalization of PSS areas – includes: stimulating PSS activities related to their internationalisation by, e.g. organizing export consortia/partnerships and implementing support tools for companies in the PSS area aimed at internationalization of products and services, and animating supra-regional R&D projects.

- Human resources development for PSS – includes: support for the development of staff and competences in response to market needs related to the operation of PSS and activities to facilitate the recruitment of staff necessary for the operation and development of PSS.
- PSS monitoring – includes: implementing the PSS monitoring system, including evaluation of current public intervention. In order for the monitoring system to fulfil its functions, it should be adapted to the current reality and specificity of a given PSS, and at the same time should ensure comparability of collected data. The PSS monitoring system was initially built based on the following tools: statistical analysis, analysis of the implementation of Agreements for PSS, research of PSS stakeholders and strategic verification panels. In relation with the bottom-up PSS selection process, it turned out to be impossible to monitor them through the Polish Classification of Enterprises (PKD) code system, which is a serious impediment to access to public data and a challenge in the further implementation of an effective PSS monitoring system. As part of the Smart Progress Project, it is planned to implement one, comprehensive and coherent PSS monitoring system, as well as to create a PSS Database and conduct quantitative research of entities from the PSS areas and analysis of the obtained data.

- Management of the Entrepreneurial Discovery Process – includes strengthening the competences of public administration employees responsible for process management and promoting the Process and its effects in the Pomorskie Voivodeship.

Monitoring of the Smart Specialisation strategy implementation relies also on external evaluation. The Organisation for Economic Co-operation and Development (OECD) has undertaken a case study[29] of local entrepreneurship ecosystems and emerging industries in the region of Pomorskie, Poland, at the request of the Polish Ministry of Investment and Development and the Office of the Marshal of the Pomorskie Voivodeship. Also, an executive summary for stakeholders was made available by

29 The full report is available for consultation at the following link: https://www.oecd-ilibrary.org/industry-andservices/local-entrepreneurship-ecosystems-and-emerging-industries_8fd63992-en

OECD.[30] The report is part of a series of OECD regional case studies that examine the main dimensions of local entrepreneurship ecosystems affecting innovative start-ups, scale-ups and innovation in existing enterprises and available industrial path development opportunities. The case study work included a study mission by an OECD-led international review panel in September 2017 and a stakeholder workshop in October 2018. It is possible that more documents will be created in the future for individual PSS as a result of cooperation with PSS Councils and PSS leaders who were selected as part of the Smart Progress initiative.

Gdansk / Pomorskie Smart Specialisation strategy Analysis

Strategy Formulation - What we Say

Four themes are used for carrying out the Smart Specialisation of the Pomorskie region. Each theme forms an umbrella, under which actors and stakeholders, skills and projects are gathered. The themes are:

- Off-shore, port and logistics technologies
- Interactive technologies in an information-saturated environment
- Eco-effective technologies in generation, transmission, distribution and consumption of energy and fuels, and in construction
- Medical technologies in the area of civilization and ageing-associated diseases.

Strategy Actions - What we Do

The region has set up a mechanism to support Smart Specialisation strategy implementation and monitories by means of a multi-functional orchestrating project: "Smart Progress - Animation of the development of areas of Pomorskie Smart Specialisation as part of the Entrepreneurial Discovery Process". This project is implemented by the Economic Development Department of the Marshal's Office of the Pomorskie Voivodeship from the funds of the Regional Operational Program of the Pomorskie Voivodeship for 2014-2020.

The Agreements with the Pomorskie Voivodeship, in which the scope of individual PPSs was clarified were signed in January 2016 by the entities identifying with the chosen Smart Specialisation priorities. Under the Agreements on PSSs, Councils of PSSs were chosen from among the signatories. They constitute a "channel of communication" between the business, scientific sectors and the administration with regard to any activities within the given area of PSS.

Strategic Competences - What we Have

The region is a significant centre of integration processes within the Baltic Sea region (BSR). It plays an important role in several areas: by providing a key link in the BSR transport chain, linking the north and west of Europe with central and southern Europe; by carrying international importance through the ever-expanding network of air connections and direct connection to Asia from its ports; by increasing numbers of international corporations or local companies which have invested abroad; by increasing numbers of international agreements signed among universities, increasing number of foreign students, and of joint research projects.

Strategic Competing - How we Win

A cooperation model is proposed which involves external companies that co-create digital solutions using public funds. The model has been developed and is currently being implemented with other EU pilot regions: Based on the Smart Specialisation priority areas thematic groups and establishment of consortia in strategic themes for the future of the region were created:

30 The summary of the report is available at https://drg.pomorskie.eu/documents/102005/2318026/OECD+Pomorskie+Report/639b1c33-ddb4-41ee-8307-a16199401001

- (PSS1) Pomorskie Platform of Autonomous Ships –
- (PSS2) Regional innovation centre dedicated to the application of space and satellite technologies in the maritime economy –
- (PSS3) Initiative to create the Polish Hydrogen Valley –
- (PSS4): Digital Health Care –

Strategy Leadership - How we Lead

Pomorskie Smart Specialisation's Councils – created for each specialisation in order to organise permanent dialogue between entities operating under smart specialisations and regional government determine the direction of specialisation development and take measures to strengthen the area of PSSs. In January 2019 the Second Agreements were signed. Support of the four Smart Specialisation priorities areas determine the main axis of activities of the Innovation Development Department of the Economic Development Department.

Analysis Summary of Gdansk / Pomorskie Region

To summarize, the strategy story of Poland is analysed through the perspective of balance between the 5 angles of the Regional Strategy Diamond. The visualization allows to position the successful actions and the identified bottlenecks (in red).

The strategy and the leadership angles indicate that efforts have intensively been applied towards regional development and have produced positive results in the remaining angles, competitiveness, competences, and actions. Some adjustments towards collaboration in the leadership angle will reflect positively on the bottlenecks in the angles of competitiveness and actions, as the restructuring of company processes and start-up facilitation will be supported. However, the actions angle could equally induce a change towards balance. Each of the dimensions in the Regional Strategy Diamond affects the other dimensions in both positive and negative results. Therefore, procedures regarding change can be triggered from any of the dimensions by utilizing current achievements to get the domains moving.

In order to achieve economic transformation, the movement from and towards the angles, inwards and outwards needs to be in constantly balance. In the case of Poland strategic programs have produced results and by eliminating the current bottlenecks the movement will continue to shift towards balance.

Strategy

- Significant Port Development
- Logistics, safety, efficiency
- Digital sustainable solutions
- New solutions needed to battle brain drain

Actions

- Port initiatives, revival, investment and community
- Cultural activities and events
- Company accelerators
- Start-up acceleration

Competitiveness

- Gdansk port is one of the biggest in the BSR
- Internationally strong maritime sector
- Creative, cultural industry
- International focus
- Gdansk-Sopot tourism opportunity

Competences

- Qualified workforce, incl. academics
- Critical mass expertice needed

Culture and Leadership

- Strategic consortia
- EU-active political leadership
- Well networked
- Attractive old Hansa town

Figure 44 Strategy Diamond of the Pomorskie Region

3.12 RUSSIA, ST. PETERSBURG – From History to the Future

Today St. Petersburg is one of the largest megalopolises of Russia and Europe, with a total population of over 6 million people taking into account the agglomeration surrounding the city. This makes St. Petersburg the second largest city in Russia and the fourth largest in Europe. St. Petersburg is the economic, cultural and tourist centre of the Northwest Federal District. The North-Western Federal District (NWFD) is the federal district of the Russian Federation in the northern and north-western parts of the country. The district consists of 11 subjects of the Russian Federation, with a population of 13,981,992 people (9.53% of the population of Russia as of January 1, 2020) and an area of 1,666,972 km^2 (9.85% of the territory of the Russian Federation). Formed by Presidential Decree of May 13, 2000. The centre of the district is the city of federal significance St. Petersburg. At the same time, St. Petersburg as a city of federal significance is an independent subject of the Russian Federation. The documents, including the strategy discussed below, as well as quantitative data apply only to St. Petersburg.[31]

Among the competitive advantages of St. Petersburg, we can list:

- One of the largest consumer high-level income markets of EAC and EU (total number of the population of the city taking into account agglomeration is over 6 million people with the high level of income);
- A high extent of diversification of city economy;
- High growth rates of GRP exceeding similar indicators of other Russian regions;
- Availability of direct access to the largest markets in Europe and Russia.

The main socio-economic indexes of St. Petersburg in 2017:

- The population is 5352.1 million people;
- The average monthly salary is about 700 Euros;
- Retail trade turnover is 17 billion Euros;
- Investments into fixed capital are 8.4 billion Euros.

The internal regional product of St. Petersburg (GRP) in 2017 was 48.5 billion Euros (9 thousand Euros per capita) that is 1.02% higher than a similar indicator of 2016. In value terms, the indicator for the year increased by 1.2 million Euros[32].

St. Petersburg takes the 3rd place in the Russian Federation on GRP volumes. Growth of the GRP indicator since 2013 testifies to a stable economic situation in St. Petersburg.

31 How to Invest in the Industry in St. Petersburg, 2019.

32 How to invest in the industry in St. Petersburg, 5th edition, 2019, https://cppi.gov.spb.ru/media/uploads/userfiles/2019/07/30/How_to_invest_in_the_industry_in_St.Petersburg.pdf

Regional Key Indicators for St. Petersburg Region

St. Petersburg is at the forefront of innovative development and for several years has been leading in various ratings, including international ones. For example:

- 4th place among 85 regions of the Russian Federation in the national rating of the investment climate prepared by the Agency for Strategic initiatives;
- Assigned the 1A rating "Maximum potential-minimum risk" in the rating of investment attractiveness of Russian regions of the "Expert RA" Agency in terms of investment potential of Russian regions in 2017;
- 2nd place out of 85 subjects of the Russian Federation in the rating of socio-economic status, prepared by experts of the rating Agency "RIA Rating" at the end of 2017;
- In 2020, the Doing Business 2020 ranking of the World Bank, which assesses the business climate of only two cities - Moscow and St. Petersburg, the Russian Federation ranks 28th.

Since 2014, St. Petersburg has been one of the three leaders in the Rating of Innovative Regions of Russia, developed by the Association of Innovative Regions of the Russian Federation for Economic Interaction between the Subjects of the Russian Federation and the Ministry of Economic Development of the Russian Federation (hereinafter - the Rating). In 2017, St. Petersburg took first place in the Rating.

Innovative development of St. Petersburg today:

- First place in the rating of innovative regions of Russia for 2017 prepared by the Association of Innovative Regions of Russia (AIRR);
- One of the leading regions where investments are mainly concentrated;
- Among the leading regions where investments in the high-tech sector are mainly concentrated,
- Among the leading regions where the ratio of results to the conditions (resources) of innovative business development exceeds 150%, which indicates the effective use of the existing regional potential;
- St. Petersburg was among the regions selected in 2016 by the Agency of Strategic Initiatives (ASI) and the Russian Venture Company (RVC) which will take part in development of regional model of the National Technological Initiative (NTI).

The level of innovation activity of the industry of St. Petersburg (the share of enterprises engaged in technological innovations) exceeds the average level in the Russian Federation of 13.8% and 7.3%, respectively.

The latest Russian Regional Innovation Development Ranking has been issued by the HSE Institute for Statistical Studies and Economics of Knowledge (ISSEK) in October 2019. Its methodology is in line with international measurement standards for innovation. The Ranking of Innovative Regions[33] was developed in 2012 for monitoring and management purposes by the Association of Innovative Regions of Russia (AIRR) in cooperation with the Ministry of Economic Development, representatives of regional authorities, and the country's leading experts.

The analytical system of the Ranking highlights the strengths and weaknesses of each region, demonstrates the dynamics of all the areas reflected

33 https://issek.hse.ru/mirror/pubs/share/315338500

by the indicators, and lets regional authorities see what they can improve to ensure further innovative growth. The analytical system of the Ranking highlights the strengths and weaknesses of each region, demonstrates the dynamics of all the areas reflected by the indicators, and lets regional authorities see what they can improve to ensure further innovative growth.

The sixth edition of the ranking comprises a system of 53 indicators for five key sub-indices: Socio-Economic Conditions for Innovation Activities Index, S&T Potential Index, Innovation Activities Index, Export Activities Index and Quality of Innovation Policy Index. Regions are ranked according to each of these sub-indices, and the final index is formed as the average of normalized values of all indicators included in the ranking.[34]

1. Moscow	0,5378
2. Tatarstan	0,5375
3. St. Petersburg	0,5356
4. Tomsk region	0,5312
5. Nizhny Novgorod region	0,4957

Table 14 Top 5 of the Russian Regional Innovation Development Ranking (published in 2019, formed at the end of 2017)

The ranking features individual profiles of 85 constituent entities of the Russian Federation. These profiles present innovation performance in detail, allowing to identify the features of each region's innovation system.

While the regions that have the most impact on innovation development have retained their leading positions for several years, their profiles show that models of successful development can be quite different. Only Moscow and St. Petersburg made it to the top 10 in each of the five sub-indices.

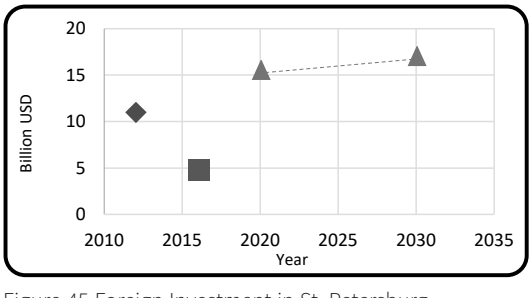


Figure 45 Foreign Investment in St. Petersburg

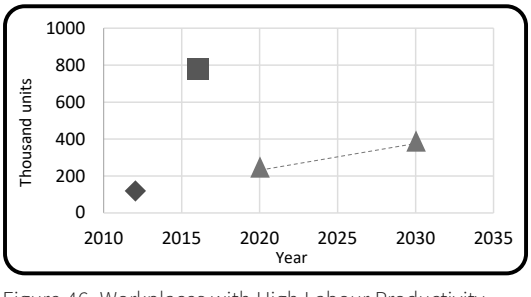


Figure 46 Workplaces with High Labour Productivity

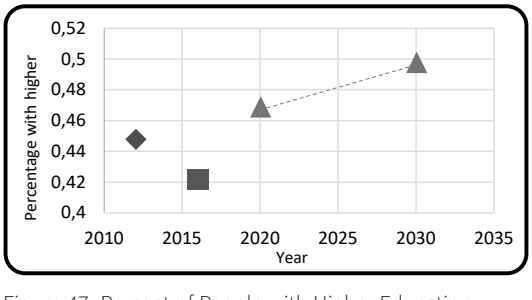


Figure 47 Percent of People with Higher Education

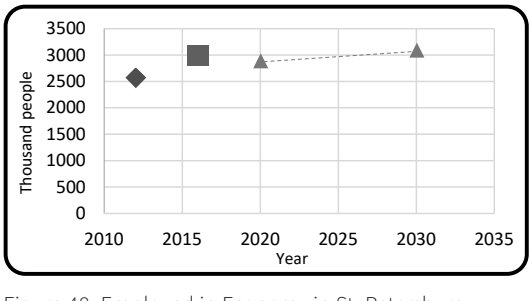


Figure 48 Employed in Economy in St. Petersburg

34 National Research University Higher School of Economics Press Release: HSE Presents 6th Russian Regional Innovation Development Ranking https://www.hse.ru/en/news/315184185.html, accessed on May 28, 2020

In 2016 the number of employed in the economy exceeded the predicted data for 2020. The forecast for 2020 needs to be revised. The percentage of people with higher education, on the contrary, decreased in 2016 compared to 2010. The figure below reflects a significant leap in the number of workplaces with high labour productivity in 2016, which exceeds forecasts for 2020 and 2030. Accordingly, the forecast also needs to be revised. Foreign investment in economy of St. Petersburg in 2016 significantly decreased compared to 2012. Forecasts for 2020 and 2030 are seen as weakly achievable and need to be revised.

Industry in St. Petersburg region accounts for 20% of the gross regional product (according to 2016 data), more than 30% of the total turnover of organizations of St. Petersburg.

The contribution of industry to the formation of the budget revenues is the largest since last years: in 2017, industrial enterprises accounted for 46.5% of tax revenues in the budget system of the Russian Federation, 19.4% of revenues in the budget of St. Petersburg (according to the KPPI based on data from the Federal Tax Service in St. Petersburg). This sector of the economy employs 17% of the working population of the city.

Table 15 Resource Background of the St. Petersburg Economic and Social Development Strategy 2030

Main indicators	2012	2016	2020	2030
	Actual data		Predicted data	
Employed in economy (thousand people)	2,530.4	2,970.5	2,966.9	3,174.2
Percent of people with higher education	44.7 %	42.3%	47.0 %	50.0 %
Workplaces with high labor productivity (thousand units)	102.7	783.1	280	400
Water use (thousand cubic meter per day)	1,625	1,416	1,500	1,500
Gross Regional Product of Saint-Petersburg (billion roubles)	2,530.4	3,742.2	5,310.5	14,000
Fixed capital investment (billion roubles)	351.9	582.3	982.7	3019
Foreign investment in economy of Saint-Petersburg (billion USD)	10.8	4.8	15.2	17
Consolidated budget revenues (billion roubles)	379.9	476.7	648.3	1401.4
Consolidated budget expenditures (billion roubles)	382.3	496.5	630.9	1401.4

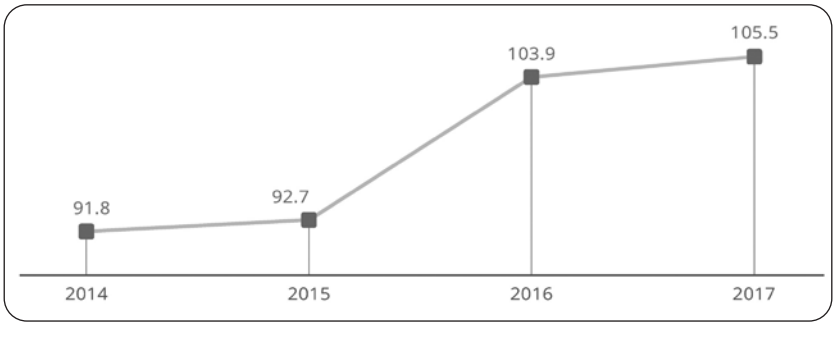


Figure 49 Industrial Production Index of St. Petersburg, in 2014–2017 in % to the Previous Year.

35 Olga Kalchen, Svetlana Evseeva, Oksana Evseeva, and Kristina Plis. Strategy of economic and social development of St. Petersburg until 2030 achievement, https://doi.org/10.1051/shsconf /20207301010

36 http://cedipt.spb.ru/media/acts/2015/12/09/StrategyBofBeconomicBandBsocialBdevelopmentBofBSt.BPetersburgBuntilB2030.pdfPetroStat 2019, http://petrostat.gNs.ru/, Government of St. Petersburg resolution 2019, http://gov.spb.ru/law?d&nd 822403603&nh

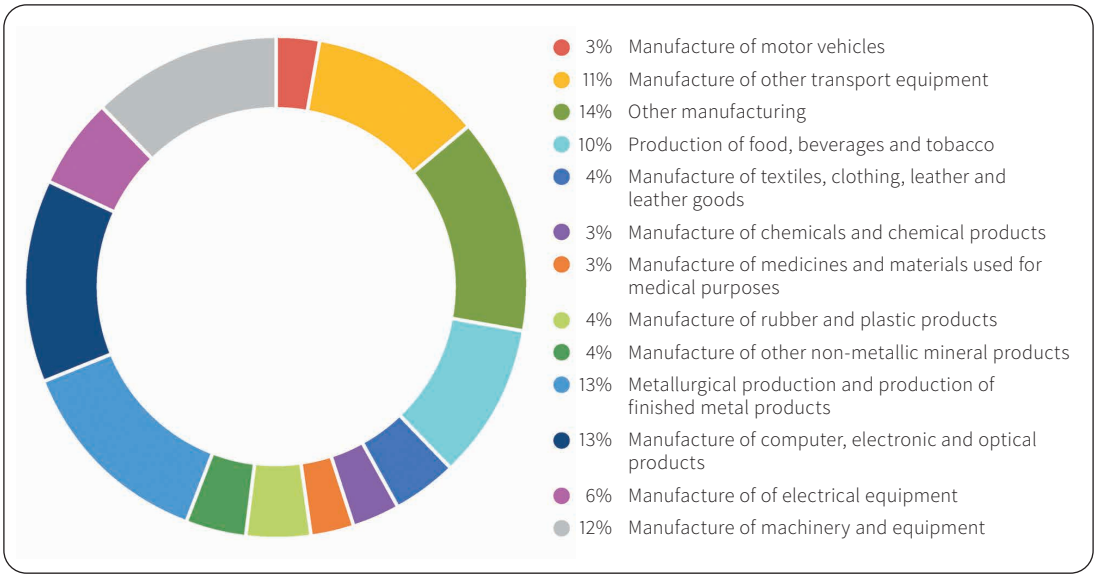


Figure 50 The Number of Employees in the Processing Industries of St. Petersburg in 2017, %.

Smart Specialization Strategy in the St. Petersburg Region

Strategy documents regarding the region of St. Petersburg that are comparable to Smart Specialization Strategy are:

- The "Strategy of economic and social development of St. Petersburg until 2035" (hereafter Petersburg's Strategy or Strategy 2035) (previous version was until 2030),
- The state program "Development of industry, innovation and agriculture in St. Petersburg", approved by the Government of St. Petersburg,
- The Smart City of St. Petersburg program.

The main strategic directions and strategic goals of these documents match with the defined goals of Smart Specialization Strategy for EU-regions[37]. As a comment to the above documents it should be noted that all these documents use the concept of "smart city" as the core factor of smart specializations. There is currently no universally accepted definition of the term "smart city" in Russia, however, the St. Petersburg City Government considers that it embraces the following ideas: saving resources, creating high-quality urban environments, and ensuring a high quality of life for the population. Also, as a crucial element in achieving these goals, the City is committed to implement the strategies through effective management of urban processes in combination with the open interaction of all stakeholders (city dwellers, business, government, etc.)[38].

37 http://cedipt.spb.ru/en/strategic-planning/

38 https://controlengrussia.com/otraslevye-resheniya/zhkh/umnyj-sankt-peterburg/

In what follows the three main strategy documents that collectively are presented above as corresponding to a Smart Specialization Strategy approach are summarized individually.

The Strategy of Economic and Social Development of St. Petersburg until 2035

The Strategy of economic and social development of St. Petersburg until 2035 is a crucial economic and political document that shapes key directions for the long-term development of the city on the basis of priorities of the Russian Federation for the period till 2035. The new version of Strategy was adopted by the Legislative Assembly of St. Petersburg and approved in December 2018. The first version of the document had a horizon until 2030.

The general goal of the St. Petersburg Strategy is in achieving the sustainable improvement of the citizens' quality of life and an increase of global competitive capacity of Saint-Petersburg based on sustainable growth resulting from the development of innovation and knowledge-based economy. The strategic priorities contain these directions:

- human capital development,
- improvement of quality of urban and living environment,
- sustainable economic growth,
- ensuring efficiency of management and civil society.

These directions are summarized under the broad strategic objective of ensuring a sustainable improvement of citizens' quality of life through sustained economic growth with the results of technology innovation and increasing global competitiveness of St. Petersburg.

Strategy 2035 is designed for 17 years (2019-2035) and the implementation is provided for in four stages:

- Stage 1 - 2019-2021;
- Stage 2 - 2022-2024;
- Stage 3 - 2025-2030;
- Stage 4 - 2031-2035.

One of the main conditions for the formation of the volume of financial resources necessary for the implementation of Strategy 2035 is the provision of sustainable economic growth in St. Petersburg, characterized by an average annual growth rate of the GRP physical volume index of 3.5-5.0% in 2019-2021 and 5.0% from 2022 to 2035.

The Government of St. Petersburg is preparing an annual report on the implementation of the Action Plan for the implementation of the Strategy for Socio-Economic Development of St. Petersburg.

The State Program "Development of Industry, Innovation and Agriculture in St. Petersburg"

In accordance with the Decree of the Government of St. Petersburg dated 2014, the State Program of St. Petersburg "Development of Industry, Innovation and the Agro-Industrial Complex in St. Petersburg" was approved. This program is aimed at a comprehensive solution of the problems of developing industrial potential, increasing the innovative activity of organizations, ensuring sustainable and efficient development of the agro-industrial complex in St. Petersburg and includes three subprograms: "Industrial Development of St. Petersburg", "Innovative Development of St. Petersburg" , "Development of agriculture and regulation of the market for agricultural products, raw materials and food".

According to the state program the industry of St. Petersburg is the basis of the economy of St. Petersburg, the main source of budget revenue. The development of industry as a basic sector of the economy affects various aspects of the socio-economic development of the region, including budget revenues and employment. Inevitably is affects the level of well-being of the population, the solution of social problems, and the state of the consumer market.

Taking into account the indicated prerequisites, goals and objectives of the socio-economic development of St. Petersburg for the long term, outlined at Petersburg's Strategy or Strategy 2035, the innovative development of St. Petersburg is identified as one of the priority areas. One of the main factors for ensuring strategic competitiveness and a necessary condition for the sustainable development of the industry of St. Petersburg is the presence of significant innovative potential in St. Petersburg[39].

The implementation of measures provided for by the state program will contribute to the activation of the investment process, will stimulate technological re-equipment of production and innovative activity of enterprises, and will create conditions for increasing the level of labour productivity in industry and increasing the competitiveness of enterprises.

In the medium term, with the implementation of the target scenario for the development of the St. Petersburg economy, the volume of shipped products will increase by 20 times by 2023 compared to 2016 and will exceed 48 billion Euros. The industrial production index for St. Petersburg in 2023 will be 132.1% compared to 2016, with an average annual rate of 104.1% (the target scenario for the development of the St. Petersburg economy).

Major priorities are outlined in the priorities and spearhead section.

The Smart City of St. Petersburg Program

The main goal of the Smart City of St. Petersburg program is to ensure the high quality of life perceived by the population. The assessment of its achievements is based on six basic principles:

- The principle of creating a comfortable urban environment for everyone. It suggests that the urban environment is provided with the needs and expectations of all population groups. We have objective and subjective expectations of a city dweller.
- The principle of coordination and interaction of all participants in the development of the city. It is assumed that all categories of stakeholders should be involved in the process of creating and using a "smart city".
- The principle of the additional purpose of urban infrastructure. It is assumed that priority is given to infrastructure elements.
- Principles of development based on monitoring, analysis and forecasting. It is assumed that a comprehensive digital description of the city as an integrated system and monitoring of its condition for solving the problems of assessing, analysing and predicting the development of the city.
- The principle of creating a digital environment for self-organization of residents and businesses. It is supposed to create a single information space.
- The principle of fulfilling the objective of "Smart City is a city where happy people live" as priority orientations towards creating positive motivation of residents by ways of interacting with the urban environment.

With regard to the "smart city" objectives, the basis for the implementation of the ideas of the "smart city" in St. Petersburg involves different advances in information and communication technologies (ICT). At the same time, the nomenclature of ICTs of the "smart city" aims to be consistent with the level of development of the City itself. ICT and "smart city" priority developments as they are envisioned should correspond to the City's real needs.

Priority Areas and Spearheads for the St. Petersburg Region

Priority areas are defined within the three Strategy programs for the St. Petersburg region. In the following the priorities are presented with reference to the three strategy documents defining the Smart Specialization developments in the St. Petersburg region: The Strategy 2035, the State Development Program for Industry, Innovation and Agriculture, and the Smart City Program.

39 http://cppi.gov.spb.ru/programs/gosudarstvennaya-programma-sankt-peterburga-razvitie-promyshlennosti-i/

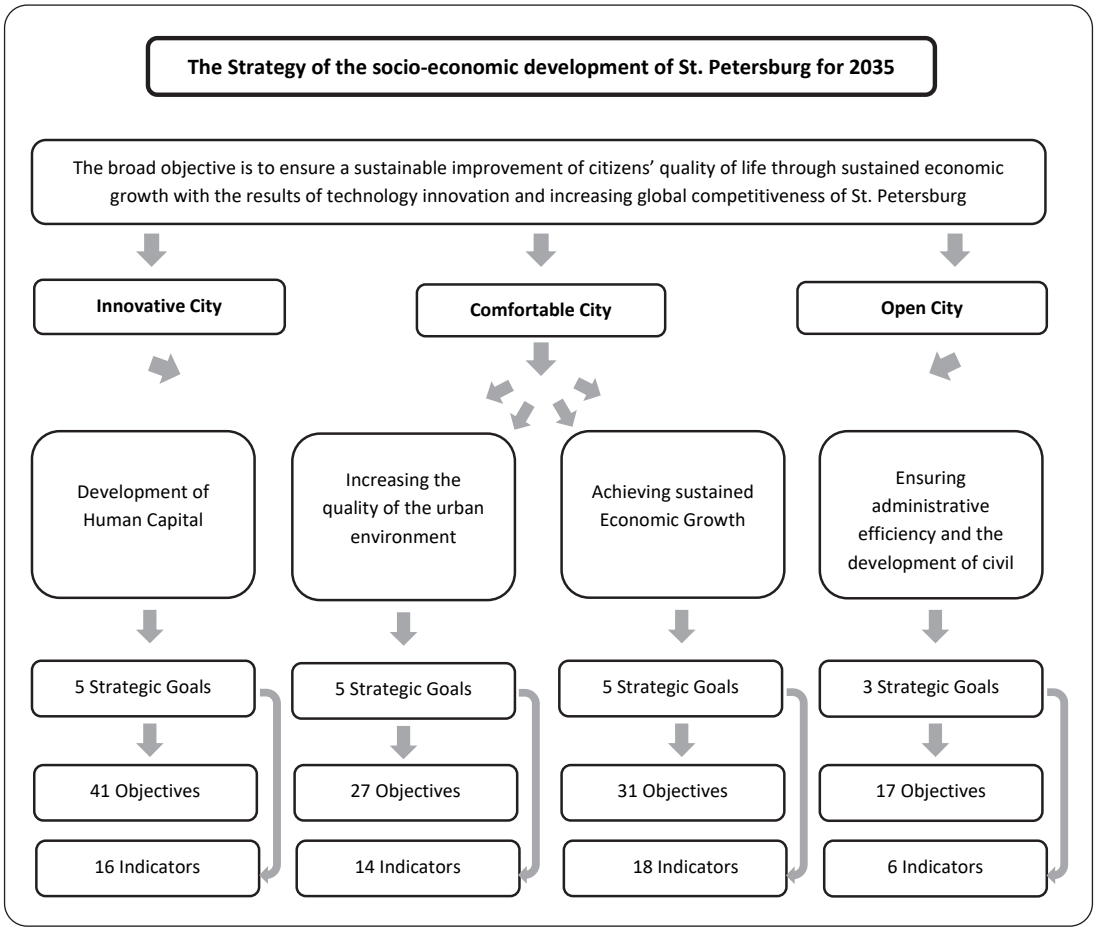


Figure 51 St. Petersburg Strategy 2035 – Objective, Priorities, Goals

Priorities of the Strategy of Economic and Social Development of St. Petersburg until 2035

To achieve the main goal as well as the goals inside every priority 17 programs have been worked out which will be realized by the 2035 (public health and increasing the life expectancy, improvement of the education quality and access to education for everybody, healthy lifestyle and social services development, innovation and technological development of the industry, sustainable economic growth, knowledge-based economy, creating ecosystem that facilitates to develop business and markets and others).

Summary of the priorities under the three main themes: Innovative City, Comfortable City, Open City is like

- The development of innovative technological activity in St. Petersburg (the priority is the "City of Innovations"), characterized by the constant development of human capital, the introduction of innovations and advanced technologies in all spheres of life, increasing the level of integration of all elements of the socio-economic system.
- Improving the comfort level of living in St. Petersburg (priority "Comfortable city"), aimed at developing St. Petersburg as a humane and liveable city that meets the principles of

the modern "smart city" in terms of spatial development and diversity of the urban environment, environmental well-being, safety and mobility.
- The development of an effective system of external and internal communications of St. Petersburg (priority "Open City"), which determines the "open" position of St. Petersburg in the geopolitical, sociocultural, trade and economic aspects, but also aimed at the development of St. Petersburg as a city open people and positive changes, proclaiming universally recognized social values and actively participating in social events, integrated into international processes.").

Priorities of the State Program "Development of industry, Innovation and Agriculture in St. Petersburg"

High-tech industries, as well as food and processing industries will have a decisive influence on the results of St. Petersburg industry.

Given the planned completion of a number of large investment projects, outstripping production growth rates (on average - 106.1% per year) can be achieved in the machine-building complex and the pharmaceutical industry.

The sectors producing consumer demand products, primarily food products, will develop at a steady pace (on average - 101.6% per year). The main factor in the growth of production in this industrial sector is the growth of population incomes.

To achieve this goal, the state program provides for measures aimed at solving the following problems:

- increasing the competitiveness of industry in St. Petersburg;
- development and effective use of the innovative potential of St. Petersburg;
- creation of favourable conditions for the development of the agro-industrial complex of St. Petersburg in order to provide the population of St. Petersburg with high-quality and safe food products.

The following table indicates the priorities and specializations with respect to the focus of special economic zones of St. Petersburg and of the industrial parks of St. Petersburg [40].

Name of the industrial zone	Area, ha	Specialization	Residents
Primorsky district of St. Petersburg			
Novoorlovskaya	110,41	• Information technology and telecommunications • Pharmaceuticals and medical technology • Energy efficiency • Accurate instrumentation	• Orion Medic CJSC • Vertex CJSC • Novartis Neva LLC • RCI Sintez • Crystal SET LLC • Quadro Electric Technology LLC
Petrodvoretsovy district of St. Petersburg			
Neudorf	18,99	• Information technology and telecommunications • Pharmaceuticals and medical technologies • Energy efficiency • Precise instrument making	• RAKURS-Engineering LLC • Pharm-holding CJSC • BIOCAD CJSC • Vertex JSC • Novartis Neva LLC • Inmed LLC

Table 16 Specialisations of the St. Petersburg Industrial Zones and Industrial Parks

40 How to invest in the industry in St. Petersburg, 5th edition, 2019, https://cppi.gov.spb.ru/media/uploads/userfiles/2019/07/30/How_to_invest_in_the_industry_in_St.Petersburg.pdf

Priorities of the Smart City of St. Petersburg Program

Six guiding principles are the foundation for selecting the priorities of implementing the "smart city" program

- The principle of creating a comfortable urban environment for everyone.
- The principle of coordination and interaction of all participants in the development of the city.
- The principle of the enhanced purpose of urban infrastructure.
- The principle of development based on monitoring, analysis and forecasting.
- The principle of creating a digital environment for self-organization of residents and businesses.
- The principle of residents' interacting with the urban environment for positive motivation

The implementation is approached from various directions: from local automation, to artificial intelligence technologies, and metacognitive technologies for managing complex socio-cyberphysical systems. In accordance with the above principles, three main areas of ICT application in the "smart city" are emphasized.

1. The first and most traditional area of smart city development includes solutions for monitoring the life processes of the city, for this purpose primary data collection devices (sensors, cameras, etc.) are intensively introduced in modern cities, including the lower level of the Internet of Things (IoT) mechanisms. In general, this approach is called the "sensitive city". The need to process a large amount of information necessitates the use of technological solutions for the collection, processing and analysis of big data. The specifics of the implementation of ICT solutions for this significantly depends on the subject area (including the incoming data volumes, requirements for reactivity and performance, as well as the representativeness of the placement of primary devices).

2. The second area of smart city development includes solutions for managing the urban development of the city. Their peculiarity consists in the need for a quantitative presentation of the integrated development goals of the city and an assessment of the effectiveness of their achievement. The solution to such problems is complicated by the fact that the city is a complex socio-technical system, which makes it impossible to reduce the task of achieving the integrated development goal of the city to achieving private development goals in certain areas. For this reason, modern approaches to goal setting in urban development involve the formation of an integrated target image of the city in a digital environment, built taking into account the structure of urban entities and the features of their interaction between themselves and with the population. A feature of ICT solutions of the "smart city" in this area is the implementation of multi-criteria optimization mechanisms in the face of uncertainty based on quantitative indices of quality of life in various fields (physiological, socio-economic, psychological). The indices themselves are constructed on the basis of retrospective and relevant city data from various sources (including both direct measurements and the results of predictive modelling).

3. The third area of smart city development provides solutions for the provision of people living in the city with new services aimed at simplifying the interaction of consumers with the urban environment. A feature of these decisions is the diversity and inconstancy of the real processes of interaction between people and the city. For this reason, it is supposed to provide the consumer with information, data and knowledge generated on the basis of available information, in all possible diversity, using multimodal interfaces of human-computer interaction. At the same time, the pro-activeness of the socio-technical services of the "smart city" is important, expressed in their adaptation to changing urban conditions and monitoring the current state and needs of the main stakeholders (in the simplest case, by geolocation).

The implementation of the digital image of St. Petersburg was used to automate the aggregation, processing and verification of data on urban areas. This allowed us to combine in a single logic such heterogeneous data as departmental statistics, results of field observations, environmental studies, opinion polls and data from online sources, including social networks.

This is necessary for the subsequent implementation of hybrid predictive models of the dynamics of the urban environment, urban mobility and the evolution of the social structure of the urban population. At the same time, predictive models can be used to analyse and forecast urban processes at various spatio-temporal scales (from planning walking routes of tourist groups to assessing the effectiveness of long-term urban development programs). In addition, with the help of a digital image, the tasks of planning the placement of objects of social and commercial infrastructure are solved. For this, data from various sources is compared and the most reliable parameters are automatically determined, popularity / attendance modelling of various points of attraction is modelled, and the actual provision of the population with social infrastructure is calculated. In general, the digital image provides a combination of data, models and aggregated knowledge in order to create decision support tools for managing urban processes.

Revisited St. Petersburg Regional Strategy

The Strategy for Economic and Social Development of St. Petersburg until 2035 was approved in December 2018 and is itself an adjustment to the previous version of the document with the horizon until 2030[41].

To implement the Strategy, with a periodicity of 6 years, the state programs of St. Petersburg are developed, containing a set of specific measures provided with resources aimed at achieving the goals of the Strategy.

Strategy Process of St. Petersburg

The formation of the base of the Strategy and its public discussion took place with the participation of: federal executive bodies, public authorities of St. Petersburg, state corporations operating in St. Petersburg, the largest business entities of St. Petersburg, scientific and educational institutions, industry associations (associations) of enterprises and public organizations of St. Petersburg. Recognizing the importance of the mutual influence of St. Petersburg and the Leningrad region, plans and projects for the development of the Leningrad region were taken into account.

Implementation participants:

1. Executive authorities of St. Petersburg
   - Committees
   - District administrations
2. Public and professional organizations of St. Petersburg
   - Association of Industrial Enterprises of St. Petersburg
   - All-Russian public organization “Business Russia”
   - Public Organization Interregional of St. Petersburg and the Leningrad Region Association of Trade Union Organizations “Leningrad Federation of Trade Unions”
   - St. Petersburg Chamber of Commerce and Industry
   - Council of Municipalities of St. Petersburg
   - Interregional public organization “Union of Journalists of St. Petersburg and the Leningrad Region”
   - Public organization “Union of Industrialists and Entrepreneurs of St. Petersburg”
   - Public Organization St. Petersburg Branch of the Russian Creative Union of Cultural Workers
   - Non-profit partnership “Transport Union of the North-West”
   - Regional public organization “Council of rectors of universities of St. Petersburg”

41 http://spbstrategy2030.ru/

Stakeholder Involvement in St. Petersburg

It is assumed, that combining the efforts of government, businesses, and society will allow St. Petersburg to succeed in the implementation of the Strategy and become a fully global city with a comfortable habitat. The effectiveness of the St. Petersburg Strategy 2035 implementation is essentially safeguarded by following the important factors identified by the City towards securing stakeholder involvement:

1. Elaborate a human-centric approach in the course of Saint-Petersburg implementation, change outdated and inefficient mindset of underestimating the input of every citizen who wants to be the part of the achieving the Strategy's goals and programs and able to add fresh way of thinking and evaluating intermediate impact of Strategy and helps to proceed its' implementation.
2. Change mindset towards the importance of partnering decision-makers, business, innovation participants, academic sector and public actors, citizens on the way of realizing the Strategy.
3. Create new forms for strong and active commitment of experts from public and business sectors for regional innovation ecosystem and strategic implementation that will help to find systematic and community-based methods for solving the challenges faced in the course of achieving of the general goal of St. Petersburg strategy and integrate them in practice.
4. Find and bring to life the most effective forms for interfacing actors interested and involved in implementation of St. Petersburg strategy.
5. Continue to develop and deepen interaction and collaboration of participants in the regional innovation ecosystem in terms of strategy implementation.
6. Facilitate social innovations and stimulate social renewal through collaboration and partnering of stakeholders.

One of the methods of stakeholder involvement is cluster policy. One of the priorities of the industrial policy of St. Petersburg is to promote the development of clusters and the creation of new cluster formations. Today, St. Petersburg is the leader in the number of clusters among the regions of Russia.

The creation of the cluster allows participants to improve their overall competitiveness, to reduce the total cost of production and research and development, to carry out joint projects, and also to attract investment.

The centre for cluster development of St. Petersburg (CCR) was established to coordinate the activities of clusters with scientific institutions, public authorities, investors, research centres, as well as to assist in obtaining state support for clusters.

Main tasks:

- Monitoring of development of the cluster environment of St. Petersburg;
- Ensuring cooperation of participants of territorial clusters and inter-cluster interaction;
- Coordination of projects of the subjects of small and medium-sized enterprises which participants of territorial clusters;
- Execution of functions of the specialized organization of innovative territorial clusters - methodical, organizational, expert and analytical and information maintenance of innovative territorial clusters.

CCR promotes cooperation between companies, simplifies and accelerates the establishment of business contacts between them, acts as a moderator in public discussions - strategic sessions of urban clusters in order to coordinate efforts and search for joint cluster and inter-cluster projects, thereby stimulating economic growth and social development of the region.

12 clusters of the region implement their projects with the support of the Centre for Cluster Development of St. Petersburg [42]:

1. Innovative Territorial Cluster "Development of Information Technologies, Radio Electronics, Instrument Engineering, Communications and Information Telecommunications in St. Petersburg".
2. Innovative territorial cluster "Cluster of medical, pharmaceutical industry, radiation technologies".
3. Territorial industrial cluster "St. Petersburg cleantech technologies cluster for the urban environment".
4. Innovative territorial industrial cluster "Composite cluster of St. Petersburg".
5. St. Petersburg Innovation and Industrial Cluster of Transport Engineering "Metro and Railway Engineering".
6. Territorial cluster "Cluster of innovations development in the energy and industry".
7. Cluster of St. Petersburg Jewellers.
8. Cluster of water supply and sanitation in St. Petersburg.
9. Industrial cluster "Autoprom North-West".
10. United Innovation Cluster of St. Petersburg "Innograd of Science and Technology".
11. Industrial cluster of marine robotics.
12. Industrial cluster "Cluster of machine-tool industry of St. Petersburg".

Monitoring Mechanisms in St. Petersburg

The main role in the preparation and monitoring of the Strategy was assigned to the Economic Council under the Governor of St. Petersburg, which is a permanent advisory body to the Governor of St. Petersburg, formed to prepare proposals on the main areas of economic policy of St. Petersburg, determine the strategy and tactics for its implementation, mechanisms, ensuring sustainable development and technological renewal of the economy, as well as balanced development of the territories of St. Petersburg.

The implementation mechanism of the St. Petersburg Strategy 2035 involves the monitoring of its performance, which allows to control the achievement of the planned results during the social and economic development of St. Petersburg, based on a comprehensive assessment of targets and benchmarks of the Strategy and state programs in St. Petersburg. The effectiveness of monitoring the strategy implementation is essentially provided by these important factors:

1. Keep on moving and applying complex and systematic solutions for the achieving the main goal of the Saint-Petersburg strategy; this means that the programs established in the strategy are to be realized cohesively and at optimal balance taking into account the principle of innovation development and undertaking into life.

2. Realize the growth capacity of the Saint-Petersburg city accomplishing regular evaluation of intermediate results of the strategy implementation:

42 How to invest in the industry in St.Petersburg, 5th edition, 2019, https://cppi.gov.spb.ru/media/uploads/userfiles/2019/07/30/How_to_invest_in_the_industry_in_St.Petersburg.pdf

- anticipate new needs of the stakeholders of strategy implementation: public and private sector, academia, applied science, industry, entrepreneurial and innovation actors, citizens,
- adjusting programs and activities of the implementation Saint Petersburg's Strategy to the new and constantly emerging challenges,
- upgrading Saint Petersburg's Strategy in accordance with economic and social changes.
- inventing and evaluating alternative ways offered for tackling with challenges and problems in economic growth critically, undertake the most appropriate ones into life.

3. Construct novel and ingenious mechanisms and instruments for creating favourable environment for St. Petersburg's Strategy implementation based on an analysis of and taking in the best practices and experience regarding implementation of RIS 3 in Europe and the world.

Concluding Remarks

In order for the economic development of St. Petersburg to proceed at an accelerated pace, it is necessary to solve a number of problems that are characteristic of all cities of Russia.

First of all, this concerns the lack of labour resources. This problem is connected both with the gradual aging of the able-bodied population due to the low birth rate in the early 1990s, and with the mismatch between supply and demand for labour. Most of the graduates of recent years are humanities, and the competition, and accordingly, the graduation rate for workers in specialties is declining. This gap is also affected by the weakening of ties between educational institutions and enterprises of the city.

Second, another problem that needs to be solved is the predominance of enterprises of the old formation in the Petersburg economy that do not use new working methods.

Third, an additional problem is the decrease in investment flow.

Joint work to eliminate all these problems will allow St. Petersburg to achieve all the economic growth indicators laid down in Strategy 2035.

All current documents are fully consistent with the UN sustainable development goals and one of its scenarios has prospects for implementation. A number of pilot innovative projects in St. Petersburg are aimed at sustainable urban development. Major research universities take part in the implementation of most of those projects; some of them are supported by instruments of cooperation across borders through project funding. Cooperation, exchange of experience, joint financing makes it possible to achieve sustainable development goals and indicators of economic and social development of such a large European city as St. Petersburg.

St. Petersburg Regional Strategy Analysis

Strategy Formulation - What we Say

The strategy of the region of St. Petersburg Strategy documents covering 17 yrs. of economic, social and smart aspects. There is a clear intent in terms of the state programme and the phases to achieve it. The basic needs of the industry are carefully mapped out and addressed in the plan. The city development objectives are based on values that guide towards a comfortable and liveable city with innovative services.

The strategy is as functional as it is generalist, following a traditional administrative approach. While the region is capable of attracting foreign investment and is a third place in the innovative regions ranking, it seems to lack strategic direction with respect to innovation. A bold prioritizing is not provided by the strategy.

Strategy Actions - What we Do

The actions are most clear with respect to city development. This is the area where most actions seem to have favourable conditions for innovation. The size of the city and the market for service development can be a fruitful ground for innovative service development. However, given

the lack of strategic direction the conditions for being a front-runner are not there.

Strategic Competences - What we Have

Scientific institutions in the St. Petersburg area are renowned and experts are not lacking. Coordination between academia and industry would allow to make optimal use of the knowledge and scientific expertise present in the region. However, a clear strategic prioritising as is proposed in the Smart Specialisation Concept would optimize the available strengths.

Strategic Competing - How we Win

Currently the tendency seems to be to build on foreign investment. This approach would equally benefit from clarity in prioritizing and from clarity in communicating the potential of regional strengths. Whether the competitive edge is identified and defined is not apparent, and transparency would positively impact the willingness to invest.

Strategy Leadership - How we Lead

The strategic objectives and regional vision are communicated on an abstract level. The existing general plan of improvements is not comparable to the strength of a carefully and inclusively devised strategy. A goal that needs to be set for an impactful way to lead is linking innovative economic transformation with the recognisable core strengths of the region. The current leadership angle carries the seed of a redefined reality for a socially and economically, technologically and environmentally powerful region, offering vital local and global contributions. However, the leadership context and culture to achieve this redefined reality based on the Smart Specialisation concept are not yet present.

Analysis Summary of St. Petersburg

To summarize, the strategy story of St. Petersburg is approached through the perspective of achieving balance between the 5 angles of the Regional Strategy Diamond. The visualization allows to position the successful actions and the identified bottlenecks (in red). Each of the dimensions in the Regional Strategy Diamond affects the other dimensions in both positive and negative results. In order to achieve economic transformation, the movement from and towards the angles, inwards and outwards needs to be in constantly balance.

The region of St. Petersburg is directing its strategy towards the well-being of citizens as well as Smart City implementation and this can be observed in the successful elements of several angles. The actions are most clear with respect to city development. This is the area where most actions seem to have favourable conditions for innovation.

With regard to the balance between the angles, the dimension of competitiveness needs improvement. Currently the tendency seems to be to build on foreign investment. Similarly, improvement is needed in the angles on strategy and leadership. Here, the focus on innovation seems lacking and objectives are presented in abstract terms which may not lead to concrete actions. This angle would benefit from clarity in prioritizing. A similar observation can be made about the angle of competences. Although experts are not lacking in St. Petersburg's scientific institutions, targeted coordination between academia and industry would allow to make optimal use of the knowledge and scientific expertise present in the region.

Therefore, for the region of St. Petersburg it is helpful to proceed by asking questions on to how to leverage the positive and successful elements in the diamond dimensions, what can be clearly focused on, how can actionable objectives be formulated concretely, how can coordination be organised to get the domains moving, eliminate bottlenecks, and achieve balance among the angles of the strategy diamond.

Strategy

- Strategy covering economic, social and smart aspects
- Smart city-focus

Actions

- City smart services and logistics
- Systematic monitoring
- Potential to become the innovation & business hub connecting EU & Russia

Competitiveness

- Biggest port and city in the Baltic Sea
- Gateway to Russian markets
- Waterway connections to the Arctic Ocean, Caspian Sea and Black Sea
- Unique large historic city centre

Competences

- Mathematics, robotics, space and ICT expertice
- Strong science traditions

Culture and Leadership

- City committees
- Centre for cluster development
- Northernmost metropolis in the world

Figure 52 Strategy Diamond of St. Petersburg

3.13 SWEDEN, STOCKHOLM REGION – Hot Spot for Youth, Capital and Innovation

The wider Stockholm region occupies 2 % of Sweden's territory and 26,7 % of Sweden's population, 32% of Sweden's GDP and 30% of new business.[43] It is an attractive and dynamic region with a highly educated population, broad business sector attracting a young population with up to 40.000 new inhabitants per year. At the same time the wider Stockholm county includes rural areas, forests and 30.000 islands. Stockholm hosts highly innovative scientific research and educational institutions such as the Royal Institute of Technology, the Karolinska Institute, and Stockholm University.

Stockholm has repeatedly scored number one in the innovation rankings in Europe and is considered an 'innovation powerhouse' of Europe. Theoretically, the region holds an excellent position fand could benefit from Smart Specialisation to fine-tune its innovation system by employing a Smart Specialisation strategy (Wøien & Teräs, 2019). The Nordregio Policy Brief of 2019 observes that Smart Specialisation has been on the agenda of the County Administrative Board, nonetheless, bringing little results in terms of raising interest for further engagement with the concept. Generally Smart Specialisation strategy has not been adopted in the Stockholm region for reasons such as lack of political ownership of the strategy and consequently challenges in mobilizing actors to apply Smart Specialisation strategy. Overall there has been a limited understanding about the added value of Smart Specialisation within the political governance structures. Nordregio's Policy Brief concludes that breaking Stockholm's tradition of non-involvement may prove to be challenging. The successes of the current system are evident, but the ability to plan for tomorrow's challenges may be lacking due to the laissez-faire approach to prioritizing strategic areas for growth. (Wøien and Teräs, 2019)

As an innovation hub the Stockholm region boasts of a persisting innovative machinery regardless of the implementation of Smart Specialisation for a new regional strategy. Although the Innovation Index of Stockholm remains in the range of 160 with reference to EU=100 average the compilation of the RII indicators show a slight decline for several consecutive years. Stockholm remains among the top three EU-28 innovation leaders, second after Helsinki-Uusimaa in 2019. The question however can be asked, would incorporating a Smart Specialisation strategy prove to be beneficial on the long term.

43 Stocksholms län landsting, 2018, https://www.sll.se

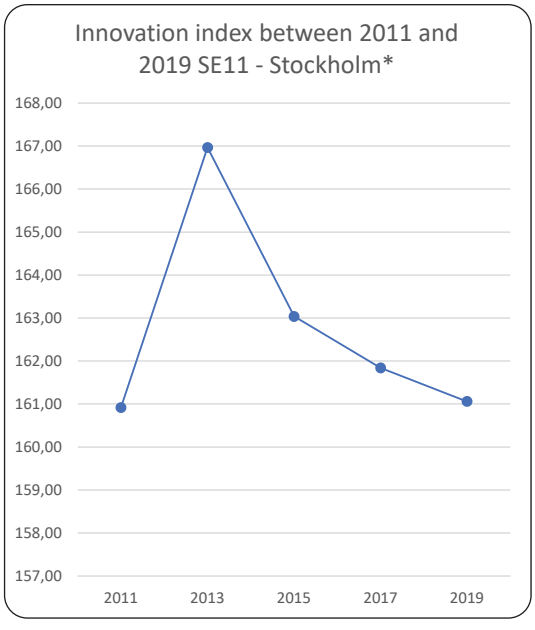


Figure 53 RII of Stockholm Region 2011-2019

Regional Key Indicators of the Stockholm Region

The innovation context of the Stockholm region is introduced with a short analysis of the Region Regional Innovation Index (RII). The two graphs below present the RII development between 2011-2019 (Figure 53) and the breakdown of the RII dimensions (Figure 54).

The RII of Stockholm 2019 (relative to EU-28 in 2011) is: Leader. With a ranking of 153.8 Stockholm is in the leading subgroup of Leader +. While the top performance was reached in 2013 the trend since 2013 shows a slight decline, although there is effectively no difference with respect to 2011.

The dimensions listed in the table to the left constitute the RIS profile of indicators in order of performance for 2019 with reference to 2011.

The Life-long learning indicator reaches a very high rank at over 300 with reference to the EU average. The performance of the Stockholm region in Life-long learning has constantly topped all other EU regions since 2015. While Trademark applications

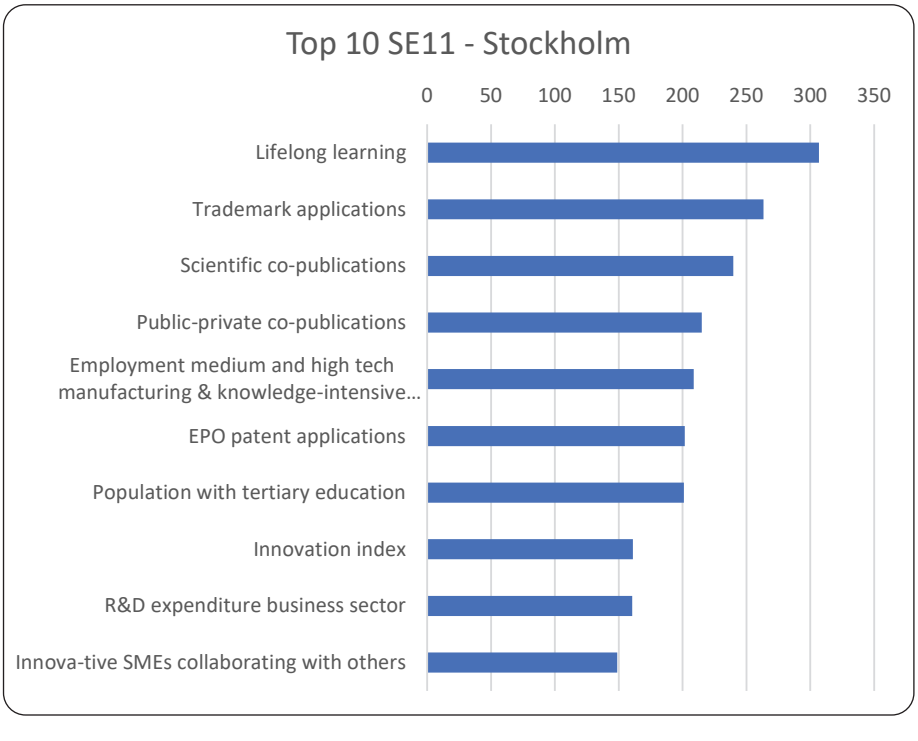


Figure 54 Stockholm Profile According to the 17 RII Indicators

and Scientific publications indicate very high-top performance traditional key dimensions supporting innovation such as R&D expenditures occupy lower positions. This includes both public and private expenditures and other dimensions such as SMEs innovating in-house, and Non-R&D innovation expenditures.

Six specific criteria out of the 17 dimensions that have significance for Innovation through Smart Specialisation strategy are commented below. For a fuller picture of the development of the region with regard to those specific dimensions over the years 2011, 2013, 2015, 2017, and 2019 please consult the tables in Chapter 4. A general summary of the regional macro-economic indicators is attached in Annex IV.

As can be noted in the tables showing yearly changes in Chapter 4, while Public R&D expenditures have been decreasing since 2015 the declining curve is contrasted by Privat R&D expenditures which have increased since 2015. Innovative SMEs collaborating with others has shown a slight increase since a drop in 2015. As mentioned, the positioning does however not outperform the EU average in any significant way. The top performing indicators maintaining the leading position of the Stockholm region reside in Lifelong learning, Trademark applications and Scientific publications.

Smart Specialisation strategy in the Stockholm Region

The analysis of the State of the Nordic Region (2020) shows that Sweden as a country, with the exception of the Stockholm region, has overall actively adopted the Smart Specialisation strategy as a concept with the help of the Swedish Agency for Economic and Regional Growth (Tillväxtverket). The Stockholm region as a top performing region has however not gone through a Smart Specialisation adaptation process. Possible explanations have included the proportionally larger size of the Stockholm region compared to the other Swedish regions. Although internationally not extensive in volume, the Stockholm region hosts a critical mass that allows a vivid and diverse economy. (Nordborg, 2018) In addition, it has been noted that its governance characteristics of a laissez-fair approach have set a steady innovation pace. Interestingly, the laissez-faire approach led to its economic strength and formed the ability of the Stockholm region to attract investments, thus leading to a situation where it is harder to create ownership of a Smart Specialisation strategy principle.

Though not explicitly integrating Smart Specialisation principles the Stockholm region has been dynamic and achieving superior results in innovation and regional development. As Stockholm has been ranked the most knowledge intensive region outside the US (Stockholm 2025, 2012), the county administration has relied on its own strategy processes. In order to strengthen the innovative capacity and the attractiveness of the region, the most influential stakeholders, policy makers and the universities have been involved in launching a strategy for the future. Its purpose is to give the Stockholm region a strong voice, where all innovation actors can come together and unite behind one mutual innovation strategy. In order to achieve the desired position as the world's most innovation-driven economy in 2025 five specific focus areas were defined:

- Research and innovation infrastructure,
- Innovation procurement,
- Supply of capital,
- Cross-sector approach and a globally attractive.

Stockholm 2025: The world's most innovation-driven economy' is the equivalent to Smart Specialisation strategy for the Stockholm Region that has also been submitted to RIM Plus, the EU Regional Innovation Monitor Plus, in 2012. Innovation Stockholm as Stockholm's innovation platform has coordinated for the development and implementation of the regional innovation strategy Stockholm 2025. An Action Plan was launched in 2013 following rounds of dialogue with key stakeholders and thematic working groups. In parallel, the strategy became an important input to the programming process directed at developing the operational program for the ERDF 2014–2020.

The regional development strategic intent for the Stockholm city and region has been updated and communicated in several documents over the years since the first strategy was recorded in the JRC Smart Specialisation Platform. Generally, the competitiveness and attractiveness of the region is the core of the strategies, with high level ambitions in creating a liveable environment for the growing population in the region, with clear priorities on green values.

- The World's Most Innovative Region, 2011
- Stockholm 2025: The world's most innovation-driven economy, 2012
- Stockholm vision 2030
- A Stockholm for Everyone, The Smartest City in the World, Vision 2040, 2015 (comprising an innovation strategy, a strategy for cooperation with higher education, a strategy for a smart and connected city)
- Strategic direction for the Stockholm Region (Strategisk inriktning) 2014-2018
- Strategic direction for the Stockholm Region (Strategisk inriktning) 2019-2022
- Strategic direction for sustainable growth and competitiveness in the Stockholm County 2025+ (Strategisk inriktning för hållbar tillväxt och attraktionskraft i Stockholms län 2015+), 2018
- Regional Development Plan for the Stockholm Region, RUFS 2050, Europe's most attractive Large City Region, 2018

Priority Areas and Spearheads for the Stockholm Region

The key to success revolves around 12 smart projects launched in 2017 based on the Stockholm Vision 2030 to make Stockholm 'the smartest city in the world'. The innovation guidelines to achieve this are: 'cooperate, be smart, prioritize'. Examples of ongoing digitization projects that makes the city smarter[44]:

- Smart, solar powered waste bins, automatically notifying when the bins have to be emptied
- Smart traffic solutions, bus traffic, especially delayed busses, being prioritised by traffic lights
- LED lighting with motion sensors for pedestrian and bicycle paths, self-controlled LED streetlights with pre-set lighting schemes and remote-controlled LED streetlights
- Absence reporting by parents and students tied together with the school food providers to avoid food overproduction
- Eye scan to identify pupils' literacy
- Digital services that raise the quality of life and increase independence for senior people
- Self-assessment tools to increase teacher's digital maturity

It is increasingly important to map the region's areas of strength, yet the County Administrative Board has limited access to funding outside the yearly earmarked funds following the state budget allocations (Länstyrelse Stocksholm, 2017).

From the UN SDGs the Stockholm Region Development Plan 2050 highlights 10 goals that are most important for the strategic priorities of the region considering environmental, social, and economic sustainability. These are: nr. 3 Good health and wellbeing, nr. 4 Quality education, nr. 4 Gender quality, Nr. 7 Affordable and clean energy, nr. 8 Decent work and economic growth, nr. 9 Industry, innovation and infrastructure, nr. 10 Reduced inequality, nr. 11 Sustainable cities and communities, nr. 12 Responsible consumption and production, nr. 13 Climate action.

44 City of Stockholm web site https://international.stockholm.se/news/2017/04/the-city-of-stockholm-adopts-a-new-strategy/

Figure 55 Stockholm SDG Priorities

Revisiting Stockholm Region RIS3

From the point of view of competitiveness, the document Strategic Direction for Sustainable Growth and Competitiveness in the Stockholm County 2025+ (2018, Strategisk inriktning för hållbar tillväxt och attraktionskraft i Stockholms län 2025+) presents the following future oriented:

- Innovation and entrepreneurship
- Attractive and sustainable living environment
- Competence development
- International collaboration and trade

New regional initiatives providing advisory services or early stage funding to entrepreneurs, innovators and small companies, have indeed taken place. With the new strategy adopted in 2017 by the city of Stockholm, Stockholm will not only carry out extensive investments in digital innovation, but also implement a strategy in digital innovation for a smart and connected city.

The new future direction of the Stockholm region is best exemplified by the Vision 2040 – A Stockholm for Everyone[45] strategy, and in the 2050 Regional development plan[46]. This is the strategy for the city of Stockholm that was put into action starting from 2017. Its themes are:

- A cohesive city
- A climate-smart city
- A financially sustainable city
- A democratically sustainable city

In order to achieve this vision, the region and the city build on innovation and on implementing smart solution together with research and industrial partners. While Sweden as a country is envisioning to reach the 'net zero' goal by 2045, the city of Stockholm will be fossil fuel free by 2040 by implementing the smart projects related to the Vision 2040.

While the Regional Development Plan for the Stockholm Region, RUFS 2050 functions more as an implementation plan, the guiding four principles it suggests are of strategic importance for the region. The four goals envision the Stockholm region as:

- An accessible region offering a good living environment
- An open region offering equality and inclusion for all
- A leading growth centre and a region of competence
- A resource efficient, resilient region with impact on climate change. [47]

45 https://start.stockholm/om-stockholms-stad/stadens-vision/

46 http://rufs.se/globalassets/e.-rufs-2050/rufs_regional_utvecklingsplan_for_stockholmsregionen_2050_tillganglig.pdf

47 http://rufs.se/globalassets/e.-rufs-2050/rufs_regional_utvecklingsplan_for_stockholmsregionen_2050_tillganglig.pdf

Figure 56 Stockholm Vision 2040 – A Stockholm for Everyone

Strategy Process in the Stockholm Region

After a couple of decades of the Stockholm region's top performance, from a comparative perspective the question that constantly arises is on one hand whether the Stockholm region, as one of the highest performing regions in innovation in the EU, has the capability to perform long-term according to its potential. On the other hand, given the fact that other Swedish regions benefit from Smart Specialisation strategy another question to ask is whether a more systematic prioritisation approach as required by Smart Specialisation would allow the region to maintain its position as a top innovation region.

Currently, rather than through a coordinated approach of Smart Specialisation the superior figures (tertiary education, numbers of researchers) can be explained by the existence of several major universities and the presence of research-intensive companies, particularly in the sectors of ICT and life sciences. Local employment secures also a high percentage of knowledge intensive business services (KIBS). However, in June 2018 the Swedish parliament voted to shift the responsibility for regional development of the Stockholm region from the County Administrative Board of Stockholm to the County Council. The impact of this change can potentially include an increase in political ownership of a Smart Specialization Strategy process.

Stakeholder Involvement in the Stockholm Region

The Stockholm-2025 strategy which was adopted as Smart Specialisation strategy for the region in 2012 was a thorough process spanning nearly two years and comprising the input from approximately 500 participants ("Wøien and Teräs, 2019).

However, regional coordination for an increased focus on cluster initiatives in prioritised sectors is not easily achieved in the Stockholm region based on its governance structure. This remains a key challenge and the need persists to continue developing the regional governance system. The region has many strong, independent actors for a strong innovation structure, providing a wide innovation base resting on academic and scientific research. Typically, there is no public agency or authority with a mandate to coordinate innovation activities at regional level, and no regional innovation strategy, or policy, are in place at regional level. Considering a future stability and expansion of innovation networks, the observation has been that the high levels of business R&D and patents in the region are to a large extent traced back to independent actors, possibly a limited number of large, global companies, which makes the region vulnerable to decisions taken elsewhere. Thus, an important challenge for the Stockholm region has constantly been to broaden the base of innovation support activities, for example in services and the public sector, and this is where Smart Specialisation could play a role.

Structural Mechanisms Instead of Monitoring Mechanisms

In the case of Stockholm, the public sector has historically not been willing to take a stand with regard to specific priorities and domains, or sectoral choices, in innovation and development at regional level. (Nordborg, 2018) Therefore, while other regions are devising monitoring mechanisms, in the Stockholm region the need lies in creating favourable structural mechanisms to secure the

future innovation capacity of the region as a whole. Interestingly, the added value of the Smart Specialisation concept cannot easily be explored due to the fact that the region is underfunded in relation to less successful regions, which undermines the Smart Specialisation strategy work needed. (Länstyrelse Stockholm, 2017)

The Nordregio case study (Wóien and Teräs, 2019) confirms that a 'lack of political ownership of the strategy and the limited understanding about added value of Smart Specialisation within the political governance structures' is behind the lack of interest around the Smart Specialisation concept. However, even if the Stockholm region continues to give evidence of a successful innovation hub several points have been raised by individual people concerned with the need to foster cluster building and communicate regional strengths in a clearer way (Norborg, 2018; Wóien and Teräs, 2019) Stronger prioritising is important for the distribution of efforts and of development funds at national and European level. As is explained in the County Administration's report on the strategic direction (2018), Smart Specialisation is not about intervening in the organic developments of the market, but about establishing continuous dialogues and collaboration with industry and academia with the aim to identify actions that can maintain the future potential and competitiveness of the region. Can dialogues bring the desired success?

The report on Strategic Directions (Nodborg, 2018) recognizes that the Stockholm region has a limited access to development funds with hampers business supporting measures as well as company's co-financing. Equally, this results in limited possibilities to solve identified regional challenges by academia and industry collaboration if the public sector is not clear on priorities given the fact that co-funding is needed. Wøien and Teräs (2019) point to a Catch 22-situation for the Stockholm region where outperformance results in less financial support.

Strategically relevant challenges, that currently are resourced by regional actors and therefore carry a potential for growth, are in the area of smart and sustainability, health and wellbeing, and industrial modernisation. These challenges demand that regional actors build on regional strengths in research and business, e.g. Life Science, ICT/digitalisation, material/ photonics, and sustainability/Cleantech. This allows Smart Specialisation to contribute strategically with the limited available public resources to focussed areas that can best benefit the development of the region. Similarly, the region needs to entertain the readiness to identify possible new future development priorities. (Nordborg, 2018) In the 2017 Swedish EU Presidency period the presidency's priorities were sustainability, continuity and adaptability. It is safe to say that these themes have influenced the innovation and development strategies of the Stockholm county with the city of Stockholm as a driver even though Smart Specialisation has not played a role in the strategic processes towards building the region's future competitiveness.

The County Administrative Board of Stockholm actively follows the competitiveness of the region by benchmarking it with other regions at international level. In doing so, the focus is on areas of specialization in those regions. For example, the increasing competition relative to developments in regions such as Munich, Copenhagen and Lyon (index 2013-2017) was noted and reported with reference to specific thematic priorities. (Effektmätning inom Innovationskraft Stockholmn, 2017). As the report of the Stockholm County Administrative Board states (Nordborg, 2018), it becomes even more important to gather together local regional actors, concentrate resources on priority areas and extend collaboration with regions that have complementing competences.

Stockholm Region Strategy Analysis

Strategy Formulation - What we Say

Currently the strategy processes in the Stockholm region are based on the principle of organic development rather than interference. However, several documents provide vision and strategic guidelines for the development of the region. In doing so, the approach is not so much to focus on existing strengths, but rather assume that the region has the necessary preconditions to succeed. Therefore, the regional strategies, or strategic guidelines project goals towards a desired future to be top, best, smartest, most innovation-driven

region, which, while functioning as slogans, give direction for action by any of the regional actors. This is a pull, rather than push approach, a better understanding of the Smart Specialisation strategy is needed.

Strategy Actions - What we Do

The competitiveness and economic performance of the region is carefully followed and benchmarked. The overall performance of the regions is not only compared to other regions in Sweden, but the assessment includes benchmarking international competing regions with similar conditions.

Since national and EU funding for development is intentionally held back in the Stockholm region when compared to other less successful regions in Sweden, actors in the region function rather independently with regard to streaming resources into developments. This creates a situation where the region could be too dependent on single, though strong, industrial actors.

Strategic Competences - What we Have

The region has one of the largest pool of competences not only in the BSR region, but also with reference to top performing European regions. Top competences are available both in academia and industry and high-level research institutions, through the presence of renowned university and other research establishments. In addition, the population in the capital region is on the rise and influx of competences is guaranteed for the future.

Strategic Competing - How we Win

The region and the city of Stockholm have a significant pool of human resources and expertise. The development of the region with regard to its attractiveness and functioning as a magnet for top expertise and business has given excellent results. The key for next strategic steps is to leverage this excellent position in a more concerted and coordinated way, including a more focused support of strategic areas to make sure the gained advantage is projected into the future.

Strategy Leadership - How we Lead

The current way of leading the region to excel as an innovative region has been an organic approach, utilising dialogue and relying gradually progressing active actors, while avoiding a forced course of change. During the time of compiling this study, Sweden as a country has been under scrutiny due to its choice of leadership in its response to the Covid-19 pandemic. The results are still pending and may be source of a prolonged discussion in the future. A situation where individual response and mobilisation is favoured has also been the approach in the overall method innovation and economic development has been led in the Stockholm region. While Smart Specialisation strategy has been tentatively part of the agenda, Stockholm is bound to find a way to lift it up for consideration and application both in strategy creation and implementation.

Analysis Summary of Stockholm Region

To summarize, the visualization of the Regional Strategy Diamond for Stockholm Region gathers the key successful actions and the identified bottlenecks (marked in red) which are assigned to each dimension of the Regional Strategy Diamond. Each of the dimensions in the Regional Strategy Diamond affects the other dimensions in both positive and negative results. In order to achieve economic transformation, the movement from and towards the angles, inwards and outwards needs to be in constant balance.

The balance in the Stockholm region would make an already strong region even stronger. The region and the city of Stockholm have a significant pool of human resources and expertise and with increased regional cooperation the long-term competitiveness angle could be secured. Actions rely predominately on large corporations. The Stockholm model has not been consciously aligned with the Smart Specialisation strategy concept and collaboration is less emphasized, though it organically takes place. The strategic direction would improve the effect of the leadership and strategy angles, as well as pull the other angles into a healthy balance.

It would be helpful for the Stockholm region to approach Smart Specialisation with the balance of the strategy diamond in mind. Asking questions with regard to how the positive and successful outcomes of the current distribution can be utilized to get the domains moving towards eliminating bottlenecks and towards balance, thus achieving a strong and favourable position with long-term benefits.

Strategy

- Focus on living space in and around the capital
- Stockholm as a capital driver
- Innovation and entrepreneurship
- Attractive and sustainable living
- Climate-smart city

Actions

- Constant improvement of living and business environment
- Private and public collaborative activity

Competitiveness

- International hotspot for youth, capital and innovation
- Magnet for top business and for human capital
- Capital-intensive economy

Competences

- Top in both academia and business
- Capital-intensive
- Health and living
- Best symbol of Nordic welfare state

Culture and Leadership

- Individual response among actors and self mobilisation are favoured
- Dialogue-led, organic approach
- Self-mobilisation and individual
- Archipelago-branded living, nature and business

Figure 57 Strategy Diamond of the Stockholm Region

3.14 Summary

Smart Specialisation in the Baltic Sea Region as a macro-region is examined in this chapter through examples of strategy stories in ten regions around the Baltic Sea. The regions' Smart Specialisation strategy practices and processes are analysed through strategy stories of how the respective regions, cities, or countries as a whole, have responded to their innovation and economic development challenges.

The source of the strategy stories are the regions of the Smart-Up BSR project and their strategy creation and revision activities from the perspective of the organisations responsible for the Smart Specialisation strategy process 2014-2020. The idea has been is to examine existing assumptions of a well-balanced unified Baltic Sea area to understand how Smart Specialisation strategy has influenced the Baltic Sea Region.

The strategy stories and analyses present ten territories which participated in the Smart-Up BSR project representing nine countries: Denmark with the Central Denmark Region and the city of Aarhus, Estonia with the city of Tallinn, Finland with the Helsinki-Uusimaa Region and the Kotka-Kymenlaakso Region, Germany with Berlin/Brandenburg, Latvia, Lithuania with the city Klaipeda, Poland with the Gdansk-Pomorskie-Sopot Region, Russia with St. Petersburg Region, Sweden with the Stockholm Region.

Each story is an overview of the region presented through the following core aspects and analytical themes which inform and guide the analyses: Regional Key Indicators, Smart Specialisation strategy Content of the Region, Priority Areas and Spearheads for the Region, Revisiting the Smart Specialisation strategy, Strategy Process and Stakeholder Involvement, Monitoring Mechanisms, and Regional Strategy Diamond.

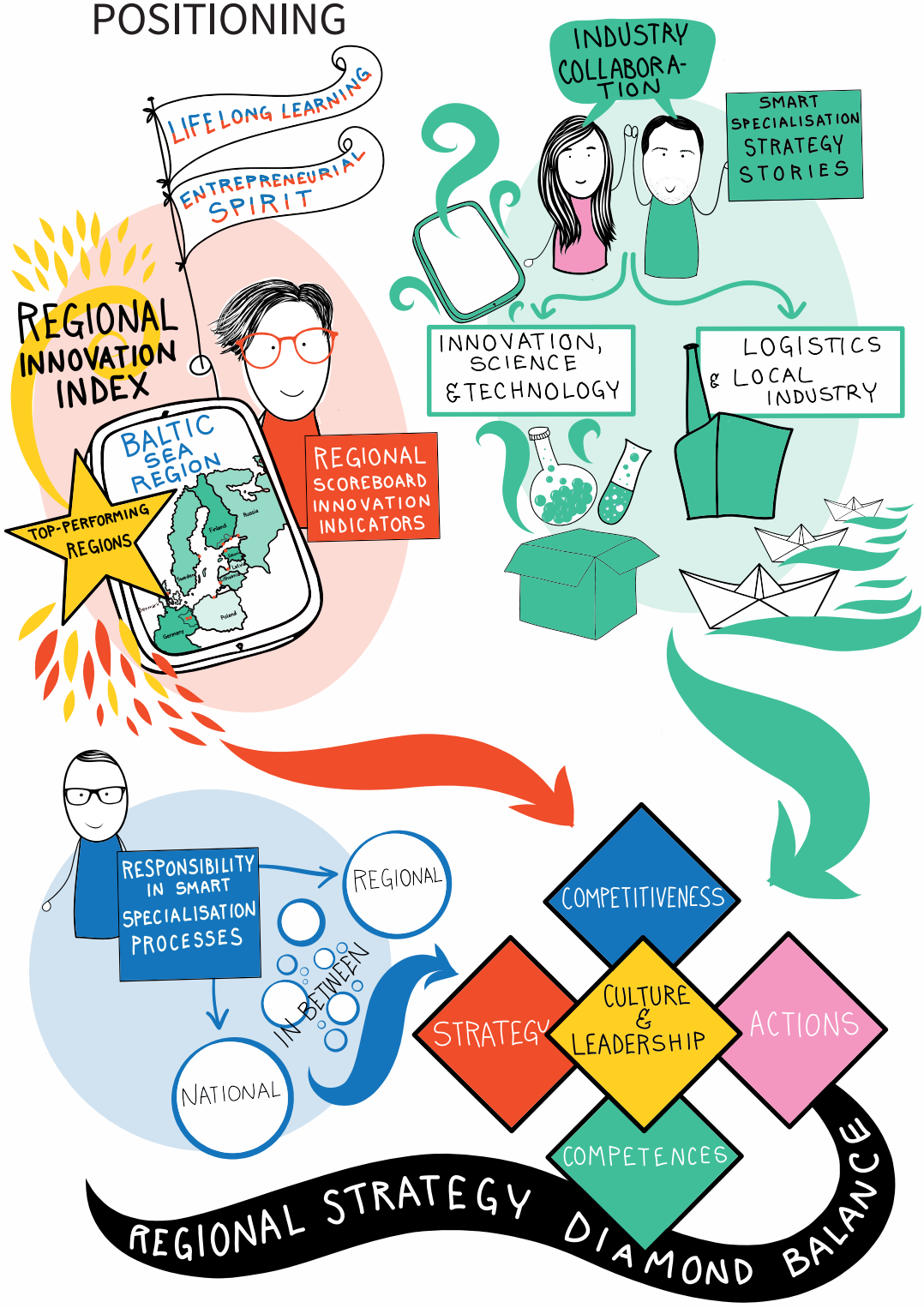
The performance results and positioning through the innovation indicators of the Regional/European Innovation Scoreboard were kept as a reference point for the region or the country throughout the examination of the analytical themes. The main focus, especially in the section on revision of the Smart Specialisation strategy, was to consider the scope of the priority spearheads and address horizontal impacts. The strategy stories also pay attention to different levels of monitoring mechanisms and stakeholder engagement in the process.

As a summary, the visualization of the Regional Strategy Diamond for each region gathers the key successful actions and the identified bottlenecks assigned to each dimension of the Regional Strategy Diamond. In order to achieve economic transformation, the movement from and towards the angles, inwards and outwards needs to aim at a constant balance. Each of the dimensions in the Regional Strategy Diamond affects the other dimensions in both positive and negative results. The Regional Strategy Diamond analysis allowed to proceed in asking questions with regard to how the positive and successful outcomes of one dimension can be utilized to get the domains moving towards eliminating bottlenecks, and thus achieving balance from all the angles of the strategy diamond.

Contrary to common belief, a closer look reveals how each region differs and is undergoing a process of alignment while operating within its particular administrative and territorial set up. However, many challenges in the Baltic Sea Region are common for several countries and have a cross-sectoral nature. Smart Specialisation is a way to increase competitiveness in the Baltic Sea regions and to achieve success in implementing sub-regional strategies. Nonetheless, the strategy creation and revision stories have not specifically included collaboration in the Baltic Sea macro-region. Possible solutions to these challenges benefit from being addressed together by various countries and sectors.

While it can be assumed that economic transformation is best achieved through cooperation within the surrounding sub-regions and countries, the strategy stories and analyses show that this aspect is yet to be developed.

4 BALTIC SEA REGION SMART SPECIALISATION STRATEGIES CROSS-ANALYSIS AND POSITIONING



4 BALTIC SEA REGION SMART SPECIALISATION STRATEGIES CROSS-ANALYSIS AND POSITIONING

In the previous chapter ten Baltic Sea regions were analysed based on their Regional Innovation Index and their strategy story regarding the creation and revision of their Smart Specialisation strategy. Through the ten partners of the Smart-Up BSR project each of the nine Baltic Sea Region countries were represented: Aarhus and Midtjylland in Denmark, Tallin in Estonia, Helsinki-Uusimaa and Kotka-Kymenlaakso in Finland, Berlin-Brandenburg in Germany, Latvia with Klaipeda, Lithuania with Liepaja, Gdansk-Pomorskie in Poland, St. Petersburg in Russia, and Stockholm in Sweden.

The strategy stories describe the regions by looking at relevant aspects of regional strategy creation throughout the Smart Specialisation strategy process. Each chapter dedicated to the participating regions has followed a structure that enables to present a comprehensive regional context around Smart Specialisation by:

- The Regional Innovation Scoreboard 2019 indicators,
- Smart Specialisation strategy content and priorities,
- Strategy processes of creation, revision, monitoring and stakeholder engagement and
- Regional Strategy Diamond analysis.

In this chapter the cross-case analysis will allow for comparability between the regions. Each region, especially when measured at country level, as the Baltic states are, differs in context, size, and volume as shown in the individual analyses. However, differences are not only tied to geo-economic factors or to socio-political factors: they are also linked to the governance approaches and the ability to realize strategy making reality in each regionies. The cross-case analysis seeks to understand, how Smart Specialisation is affecting and directing the self-assessment and self-reflective activities of each region with regard to strategic decisions.

By using a similar structure in the strategy stories the intention has been to aid the regions, and the organisations asserting and advancing innovation, to re-examine the strategy creation processes. This may also facilitate a continuous re-assessment and encourage the regions to revisit the processes driving regional transformation. In addition, the idea has been to trace inter-regional elements and in observing comparatively, how BSR Smart Specialisation realities create the awareness for a cross-regional potential.

Accordingly, the cross-case analysis provides a collection of regional strategy stories by associating their elements into four perspectives that facilitate comparison. The four perspectives of the analysis are by:

Analysis 1 – Regional scoreboard innovation indicators

Analysis 2 – Smart Specialisation strategy stories

Analysis 3 – Responsibility and ownership of Smart Specialisation and

Analysis 4 – Regional Strategy Diamond balance.

In the following the four cross-analyses of the ten regions are presented. The key findings and results are presented in chapter five.

4.1 Analysis 1 – Regional Innovation Scoreboard Indicators

Below we will analyse and compare the regions represented in this study based on the top performance and on the selected indicators from the Regional Innovation Scoreboard (RIS). This Regional Innovation Scoreboard (RIS) is used to position the innovation regional leaders and support for Smart Specialisation strategy creation. However, the Baltic States neither St. Petersburg are not represented in Regional Innovation Scoreboard (RIS). Therefore, for Estonia, Latvia and Lithuania, we use the European Innovation Scoreboard (EIS), which represent the indicators in country level, which is in line with their decision for a national approach to Smart Specialisation. The European Innovation Scoreboard (EIS) dimensions at the country level correlate almost completely with the criteria for the Regional Innovation Scoreboard (RIS) index. The difference is rather in granularity than in quality.

Of the 17 Regional Innovation Index (RII) indicators which describe the innovation capacity of a region, six indicators: were selected to be applied to all regions in this study as having significance for the Smart Specialisation strategy. Indicators were chosen with the following intent: they must symbolize collaboration, include many sectors of society and factor in SME activities which are complementary to knowledge-heavy dimensions such as high-level research for science-based technological innovations.

A description of the selected six indicators as described in the Regional Innovation Scoreboard:

Life-long Learning: Lifelong learning encompasses all purposeful learning activity, whether formal, non-formal or informal, undertaken on an ongoing basis with the aim of improving knowledge, skills and competence. This indicator includes the total population aged between 25 and 64.

Innovative SMEs Collaborating with Others: This indicator measures the degree to which SMEs are involved in innovation co-operation. Complex innovations often depend on companies' ability to draw on diverse sources of information and knowledge, or to collaborate on the development of an innovation. The indicator measures the flow of knowledge between public research institutions and firms, and between firms and other firms. The indicator is limited to SMEs, because almost all large firms are involved in innovation co-operation.

Public and Private R&D Expenditures: R&D expenditure is one of the major drivers of economic growth in a knowledge-based economy. R&D spending is essential for improving production technologies and stimulating growth. Public expenditure is gained from R&D expenditures in the government sector and the higher education sector. The R&D expenditures in the private sector represent business investments in R&D (BERD and capture the formal creation of new knowledge within firms. It is particularly important in the science-based businesses where most new knowledge is created in or near R&D laboratories.

Non-R&D Innovation Expenditures in SMEs: Innovations on the market derive not only from R&D expenditures. This indicator represents the sum of total innovation expenditure for SMEs, excluding R&D expenditures. Several of the components of innovation expenditure, (e.g. equipment, machinery, acquisition of patents and licenses) measure the diffusion of new production technology and ideas.

SMEs Innovating In-House: Number of SMEs with in-house innovation activities. This indicator measures the degree to which SMEs that have introduced any new or significantly improved products or production processes have innovated in-house.

In order to have comparability between all regions the same six criteria are highlighted for each region's Smart Specialisation strategy Story in the previous chapter.

As regions have individual contexts, it is also relevant to look at dimensions individually whether they show particular excellence, or whether they underline a specific gap. However, with comparability in mind a unified approach is chosen in this analysis with the criteria selection.

Regional Innovation Index Analysis

This section positions all the regions in this study according to their innovation performance as measured by the Innovation Index in the Regional Innovation Scoreboard (RIS). The European Innovation Scoreboard (EIS) for is used for Baltics, because the Regional Innovation Index (RII) is not available for them.

The figure below (Fig. 58) lists all ten of the analysed regions in the study according to their Innovation Index performance.[48] The Regional Innovation Scoreboard measures innovation performance every two years and indicates the Regional Innovation Index level. For the three Baltic States, Estonia, Latvia and Lithuania, where only country level innovation performance is measured, the data is extracted from the EIS, which provides yearly figures.[49] The comparison does not include the region of St. Petersburg.

At first glance the comparison of the Regional Innovation Index (RII) above does not show significant overall changes in the positioning of regions over the years. We can observe from this innovation performance comparison that in most regions the trend is upwards. Even top performing regions, like Helsinki-Uusimaa and Berlin were able to increase their performance though they already occupy a very high position. Helsinki-Uusimaa has taken the leading place in the EU ranking thanks to increased performance and due to the slight decrease of the Stockholm region. Midtjylland and Stockholm both show a slight decline, although their position remains on a very high level. Estonia indicates the steepest rising curve. This is mainly due to the performance of the capital city, and to some extent the performance of the university city of Tartu. Another interesting observation is that there are high performing regions, Stockholm,

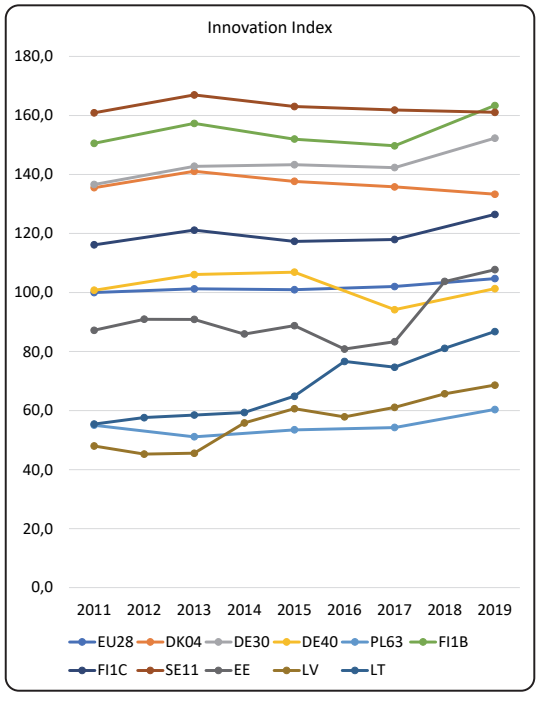


Figure 58 Innovation Index Compared to EU28 in 2011

DK04	Midtjylland, Denmark
DE30	Berlin, Germany
DE40	Brandenburg, Germany
PL63	Pomorskie, Poland
FI1B	Uusimaa, Finland
FI1C	Etelä-suomi, Finland
SE11	Stockholm, Sweden
EE	Estonia,
LV	Latvia,
LT	Lithuania

48 100 indicates the European average performance. Both RIS and EUS use 2011 as reference. The regional innovation index (RII) reaches till 2019 and the EIS till 2018, at the time of writing the EIS figures for 2019 were not available yet.

49 The Regional innovation scoreboard (RIS) is a regional extension of the European innovation scoreboard, assessing the innovation performance of European regions on a limited number of indicators. It covers 238 regions across 23 EU countries. The RIS 2019 is a comparative assessment of regional innovation based on the European innovation scoreboard methodology, using 18 of the latter's 27 indicators. In provides a more detailed breakdown of performance groups with contextual data that can be used to analyse and compare structural economic, business and socio-demographic structure differences between regions.

Midtjylland, and Brandenburg, which have stayed in their high position since 2011, even though their economies may have fluctuated.

In addition to Estonia's sudden upwards turn, we also see that Latvia and Lithuania have considerably improved their positions since 2011. The separate charts of the individual indicators show more fluctuations and variations over the years. The sub-region of Kotka-Kymenlaakso is represented by the larger region of Southern Finland (Etelä-Suomi), which includes areas of university cities. Thus, Kotka-Kymenlaakso position is not set by that index.

Below follow the analysis of indicators of 20-40 top performing regions and deeper analysis of the selected six innovation indicators, which clarify aspects influencing Smart Specialisation strategy creation and implementation success.

Analysis of Top Performing Regions Common Indicators

At first, we compare the top indicators of the top performing regions. In the Regional Innovation Index (RII), 38 regions are categorized top performing or Leader/Leader+ regions. These score more than 20% above the EU average. Notably several indicators in the Leader regions are related to scientific excellence like Scientific co-publication, which score among the top criteria for the top performing regions like Stockholm, Helsinki-Uusimaa and Berlin-Brandenburg.

By emphasizing high level research and scientific publishing and co-publishing these indicators describe a narrow approach to innovation than indicators used to categorize SMEs or a broad range of collaborative activities. However, science powerhouses also correlate with a higher number of Trademarks and PCT-patent applications, which are missing in moderately and modestly performing regions. Scientific excellence with constant new product development leading to trademark applications are less present in regions relying on wider sectors of the local economy, including logistics or rural industry. The challenge for these regions is to engage Smart Specialisation principles to link local strengths with the international collaboration in research, science, and technology.

It is worth noting that Estonia's regional innovation index indicating a sharp rise in performance includes Trademark application as second top indicator (with the level 225). Interestingly, the Central Denmark Region (Midtjylland) is reaching to the top with the level 210, even though Midtjylland is situated within a different range of the Regional Innovation Index (RII). Helsinki-Uusimaa, Stockholm and Berlin are performing the best in this index.

Alongside Life-long learning, Trademark applications is an indicator accompanying top results in the Innovation Index. European regions who record a high level of Trademark applications and Lifelong learning in their indicators constellation also score well in the overall Regional Innovation Index. In BSR this is the case for Helsinki-Uusimaa and for Stockholm. The exact three dimensions that correlate with the long-term top-performance of regions like Helsinki-Uusimaa and Stockholm are:

- Life-long learning,
- Trademark applications,
- Scientific co-publications.

With regard to changes in innovation performance over the years since 2011, in the Helsinki-Uusimaa region the biggest shift in performance as calculated in the Innovation Scoreboard has taken place in the following three criteria: life-long learning, trademark applications and scientific co-publications. These criterions currently indicate top performance. In 2019, Helsinki-Uusimaa is the EU innovation leader.

The combination of these three criteria denotes a balance between entrepreneurial capacity and scientific/research competence supported by a wide-ranging societal effort in upholding skills and knowledge. This highlights the importance of working together in strategic actions.

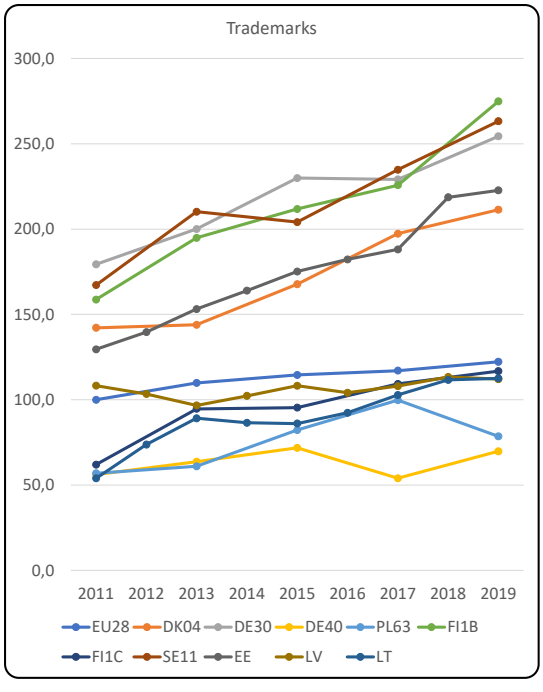


Figure 59 Trademarks Compared to EU28 in 2011

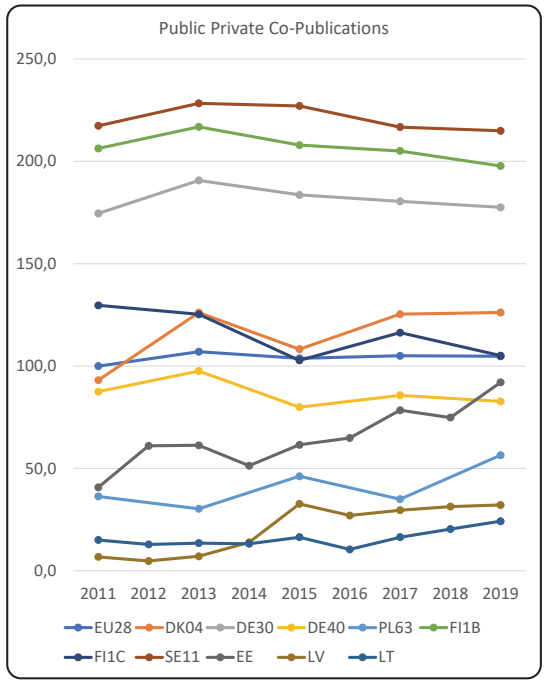


Figure 60 Public-private Co-publications Compared to EU28 in 2011

DK04 Midtjylland, Denmark, DE30 Berlin, Germany, DE40 Brandenburg, Germany, PL63 Pomorskie, Poland FI1BUusimaa, Finland, FI1C Etelä-suomi, Finland, SE11 Stockholm, Sweden, EE Estonia, LV Latvia, LT Lithuania

Cross-case Analysis Based on Six Selected Indicators

In the following, the cross-case comparisons are based on the selected six key indicators of the Regional Innovation Scoreboard: Lifelong learning, Innovative SMEs collaborating with others, Public and Private R&D expenditures, SMEs innovating in-house, Non-R&D expenditures as they have been used in the strategy stories in this study. The choice of six selected indicators is explained below. The main reasoning is to clarify, which innovation aspects influence the Smart Specialisation strategy creation and implementation success.

The cross-case comparisons 2011-2019 show the dynamics of these six dimensions in order to understand how they affect the increase or decrease in the performance. In Baltic Sea regions with moderate or modest Regional Innovation Index (RII) performance the position fluctuates and changes. The top performing regions show a more stable position, fluctuations are contained within small range of change. Regions with a similar RII score may in fact show different textures of regional competitiveness, resilience, and innovation. If regions can associate observed fluctuations with policy decisions and implementations, this would provide insight on the resulting variations and guidance for future strategic decisions.

Below, this study analysis the indicators of Life-Long Learning; Public and Private R&D expenditures and Innovative SMEs collaborating, SMEs Innovating In-House and Non-R&D Expenditures.

Analysis of Indicator: Life-long Learning

The Life-long Learning indicator by the Innovation Scoreboard is a marker for high performance. Both the top regions in 2019, Helsinki-Uusimaa and Stockholm, list Life-long learning as the

top performing indicator. Life-long learning is prominent in two other regions that score relatively high even though they are not capital regions: the Kymenlaakso region in Finland and Midtjylland in Denmark.

Life-long learning as an indicator points to a learning region or a learning city. A learning region conducts not only improvements of the formal education level in the region, but also a certain level of social cohesion and active interaction towards development of knowledge and skills. As a whole it indicates a way of approaching changes in the economy which includes an ability to interact among the regional participants, and thus produces resilience in competitiveness development. The basic idea of a learning city or region implies that competitiveness under conditions of globalization is determined by the ability to learn.

Riga, Vilnius, Klaipeda, Liepaja, Gdansk, and Kotka are cities where learning and capacity building are important methods to build up the talent pool needed to increase the competence level in specific priorities with the intent to reach higher competitiveness in those focus areas. One of the objectives of the Interreg project Smart Up BSR included mapping stakeholder involvement and initiatives in competence building activities. Regions systematically mapping out the availability of competences can use this knowledge and draw on strategic measures charted to specifically address this aspect of competitiveness.

Estonia, especially Tallinn shows a sharp increase of the Life-long learning indicator which can be connected to the clear rise of Estonia in its overall performance, as the Innovation Index indicates. Berlin's high positioning also rests on a strong base of Life-long learning.

Participating in lifelong learning is essential for a sustainable and broad pool of innovative initiatives involving a broad spectrum of society and business activities.

Analysis of Indicators: Public and Private R&D Expenditures

The analysis of R&D expenditures shows that in the top performing regions in BSR the expenditures stay stable in the public, or the private sector.

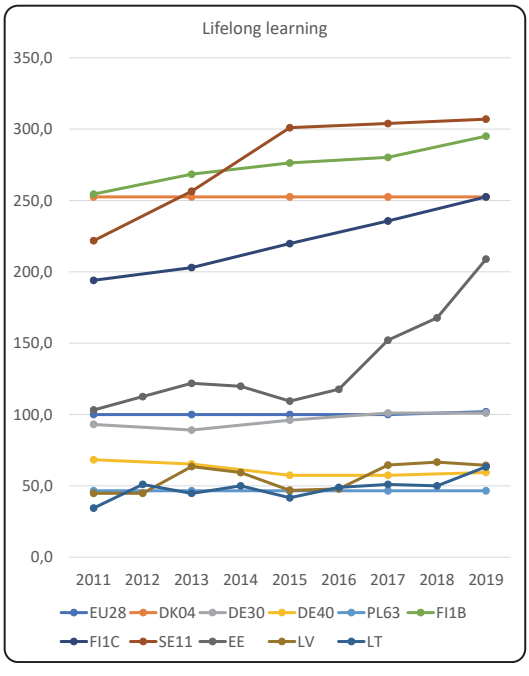


Figure 61 Lifelong Learning Compared to EU28 in 2011

DK04	Midtjylland, Denmark
DE30	Berlin, Germany
DE40	Brandenburg, Germany
PL63	Pomorskie, Poland
FI1B	Uusimaa, Finland
FI1C	Etelä-suomi, Finland
SE11	Stockholm, Sweden
EE	Estonia,
LV	Latvia,
LT	Lithuania

Berlin occupies a real outlier position for Public R&D expenditures, with a steadily higher performance than the rest of the regions. Brandenburg is also positioned high at equal level with Helsinki-Uusimaa, where the Public R&D expenditures have been declining. In the Business R&D expenditures it is Stockholm and Helsinki-Uusimaa who perform highest, while Berlin is positioned lower, between Midtjylland and Kymenlaakso.

Midtjylland shows stability while Kymenlaakso's decreasing performance in Business R&D expenditures based on the RIS indicators seems surprising in light of the findings of the strategy processes analysed in this study. The strategy story of Kymenlaakso finds that actions have been

taken in the last year and Kymenlaakso's firms are committed to excel in innovation and are putting innovative products on the market. The successes of Kymenlaakso's firms don't seem to be a result of Private R&D expenditures, but rather as seen later, of In-house innovation.

While Business R&D expenditures don't show a great variation in repositioning regions, there is one exception where fluctuation has occurred. Estonia has shown a sharp increase in 2012 followed by a low dip. The curve continues to bounce as the Business R&D expenditures return to the 2012 level followed by a continuing decrease after that. Also, the Public R&D expenditures in Estonia have decreased and though in 2018 they did show a slight increase. All Baltic countries showed a slight increase in 2018 in Public R&D expenditures.

Pomorskie on the other hand has steadily increased Business R&D expenditures, while decreasing expenditures in Public R&D after a peak in 2015. Pomorskie's performance is relatively high in Business R&D expenditures as it scores over 80, not being too far from the EU average. In Business R&D expenditures both Lithuania and Latvia are lagging after. Both have had fluctuations in Public R&D expenditures, but are showing signs of a slight increase

Analysis of indicators: Innovative SMEs Collaborating with Others, SMEs Innovating In-house and Non-R&D Innovation Expenditures

The degree to which SMEs collaborate, innovate in-house and introduce product or process innovations is relevant for regions to understand. The following indicators represent SMEs expenditures related to innovation and indicating the diffusion of new products and technology. However, the consistency and quality of the data over the years has not been validated in the charts.

While the regional innovation performance of Estonia shows the steepest upward turn compared to other regions, Estonia also shows the highest increase in the SMEs collaborating with others indicator. Among other indicators in Estonia, which also show an increase, Innovative SMEs collaborating with others distinctly records the highest change. Helsinki-Uusimaa occupying the top position in the overall RII 2019 also shows a sharp increase in Innovative SMEs collaborating with others. These examples suggest that the indicator Innovative SMEs collaborating with others correlates with regional competitiveness and growth.

A peculiarity of the Estonian performance in Innovative SMEs collaboration with others is that it has already been strong in 2011 and has constantly declined until the sharp upward turn in 2017. A similar dip was seen in Midtjylland, starting with strong Innovative SMEs collaboration at the same level as in Estonia in 2011 followed by a sharp decline. In Midtjylland, however, the recovery has not taken place, and the performance in this indicator remains to be far below the 2011 level. The Kymenlaakso region also shows a constant increase in Innovative SMEs collaboration with others.

Overall, each region shows an increase in performance for this indicator, except for Lithuania. Lithuania held a relatively high level for Innovative SMEs collaboration in 2011 but has not yet turned around from a dip in performance in 2014. While Poland, which, for this indicator recorded low performance already in 2011, is showing an upward trend. However, it has still not reached its 2011 level in this respect.

While Innovative SMEs collaborating with each other as an indicator signifies entrepreneurial spirit and secures the ground that sustains entrepreneurial capacity building it is in combination with the resulting new products and trademark applications that a region reaches a highly competitive position.

The next indicator measuring SMEs Innovating In-house shows a group of regions with a clear turn upwards and a mixed group of regions with fluctuations and changes. Estonia shows the biggest fluctuation with a steep recent increase (2018). Also, on the rise in entrepreneurial activities through SMEs innovating in-house are Kymenlaakso, Helsinki-Uusimaa, and Midtjylland. The high level of in-house innovation in the Kymenlaakso region is consistent with the finding of the strategy story which indicates that Kymenlaakso local companies have succeeded with innovating and commercialising innovative products.

Another indicator that marks rising curves in some of the BSR countries moving upwards on

the innovation performance scale is Non-R&D innovation expenditures. The fluctuations among regions related to this indicator are notable, especially for Estonia, Lithuania, and Latvia. Both Berlin and Brandenburg indicate a rise in Non-R&D innovation expenditures, while Pomorskie with minor fluctuations over time positions around EU average. With reference to the other indicators this is where Pomorskie scores highest.

Kymenlaakso, Stockholm, Helsinki-Uusimaa, Midtjylland have exchanged their top position to a low one in comparison to the other regions. It has to be noted however, that though not leading they are not far from the EU average. On the other hand, Lithuania and Estonia occupy a very high position above 200, which is surprisingly double the EU average.

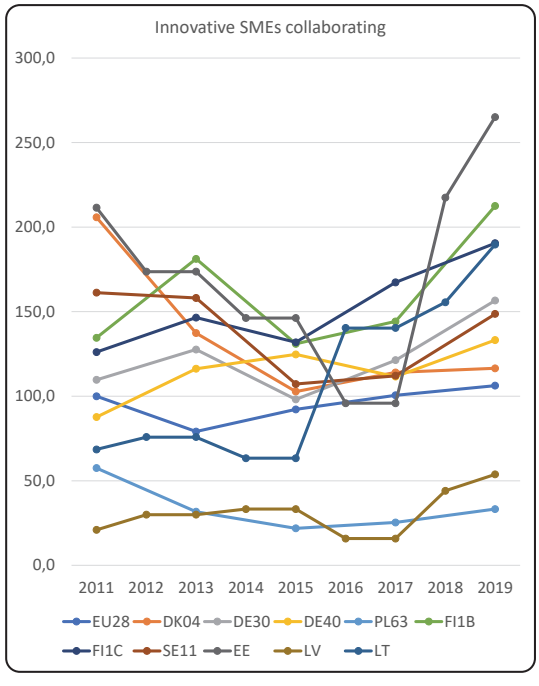


Figure 62 Innovative SMEs Collaborating Relative to EU28 in 2011

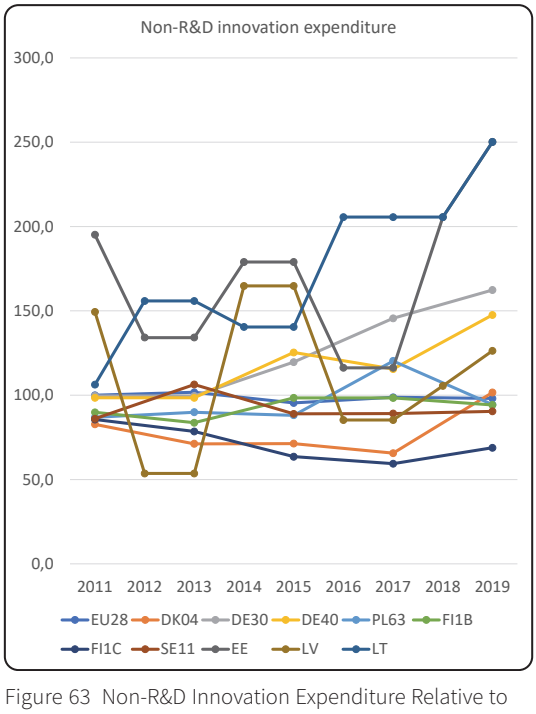


Figure 63 Non-R&D Innovation Expenditure Relative to EU28 in 2011

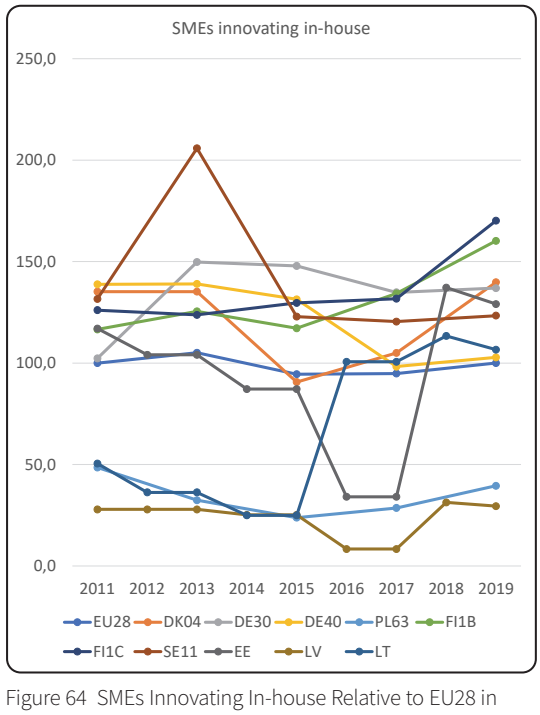


Figure 64 SMEs Innovating In-house Relative to EU28 in 2011

DK04 Midtjylland, Denmark, DE30 Berlin, Germany, DE40 Brandenburg, Germany, PL63 Pomorskie, Poland
FI1BUusimaa, Finland, FI1C Etelä-suomi, Finland, SE11 Stockholm, Sweden, EE Estonia, LV Latvia, LT Lithuania

Summary of Analysis 1 – By Regional Innovation Scoreboard Indicators

In this analysis, we positioned all the regions in this study according to their innovation performance as measured by the 17 indicators of Regional Innovation Scoreboard (RIS) called Regional Innovation Index (RII). However, the Baltic States are not represented in Regional Innovation Scoreboard, and therefore country level indexes are used based on the European Innovation Scoreboard (EIS), which comply with their decision for a national approach to Smart Specialisation. As the Regional Innovation Index (RII) describe the innovation capacity of a region, it is a proxy for success for regional smart specialisation strategy creation and implantation together with stakeholders.

To deepen the analysis, the six key indicators - Lifelong learning, Innovative SMEs collaborating with others, Public and Private R&D expenditures, SMEs innovating in-house, Non-R&D expenditures – from Regional Innovation Index (RII) were selected to be applied to all regions in this study to explain and compare their performance deeper, as these indicators were suspected to carry high significance for the Smart Specialisation strategies. The selected indicators symbolize learning, collaboration, funding expenditures as well as SMEs innovations. In that way, in addition to science-based technological innovation, the wider sectors of society, and SMEs are included in the analysis. This study offers deeper understanding of learning and learning regions, innovation funding and entrepreneurial spirit.

Alongside the indicators of Life-long learning, Trademark applications and Scientific co-publications accompany top results in the Regional Innovation Index (RII). European regions which perform well on these indicators, also score well in the overall Regional Innovation Index (RII), which is case for Helsinki-Uusimaa and for Stockholm. Regions sharing this combination of indicators, we call them as capacity powerhouses.

A balance between entrepreneurial capacity and scientific/research competence with wide-ranging societal skills and knowledge is required for successful regional Smart Specialisation strategy creation and implementation. This means that it is important to work together and prioritize strategic actions.

4.2 Analysis 2 – Smart Specialisation Strategy Stories

This second cross-case analysis derives from the strategy stories of the participating regions and partners in the Smart Up BSR project. The partners represent organisations responsible for Smart Specialisation and Innovation regionally, at local municipalities, or at national ministries or agencies in nine BSR countries including St. Petersburg. Already, the strategy stories analysed show that regions are different how they strategically drive innovation and economic growth. Regions driving forces may be either 1) Innovation, Science and Technology or 2) logistics and local Industry. Some of the regions rely heavily on industry Collaboration and clusters. Some of the regions prioritize and focus, some of them diversify. Regions have different history, government structure, socio-economic developments, and the geo-economic space, regional inhabit, as well as the extent to industry, which have an effect on smart specialisation strategy creation and implementation.

The first source of innovation relies on excellence science and research. This implies that in some regions science and research have a more prominent role in the strategy, which consequently brings the strategic focus towards enabling and supporting emerging new industry based on scientific and technological innovation. This result higher international collaboration and emphasizes on competitive advantage and critical mass at local level.

In other regions the strategy is more territory and local industry based. Thus, they rely more on regional actors, regional supply chains and actors of the local economy. The regions may rely on clusters in order to build on bridging research and industry. This may combine science- and market-

driven innovation outlook. The regions also differ based on priority, focus and diversification. In the following, we review innovation, science and technology strategy focus deeper.

Strategy Focus on Innovation, Science and Technology

European level leaders based on innovation, science and technology are Helsinki-Uusimaa, Stockholm and Berlin/Brandenburg. These regions link regional development and high-level of science and technology activities. The level of science and technology affects directly to innovative and transformational economic development as embedded in the fabric of the regions.

The science and technology play a predominant role in the Smart Specialisation strategy in Stockholm, Helsinki-Uusimaa, Tallinn, Aarhus-Midtjylland, and to some extent Riga. In addition, we find more regions that have specifically focused on economic development driven by institutions exhibiting top performance in science and technology. Estonia, Latvia and Lithuania are showing clear indications in their strategies that they are moving towards a knowledge infrastructure within a their regionally networked innovation system. In addition, the recommendation for all is to focus on more entrepreneurship spirit, research and education, life-long learning in order to increase the significance of innovation for regional growth. And the OECD study more specifically recommends on cross-sector fertilization to increase the efficiency of Smart Specialisation strategy Implementation.

The largest high-quality science hubs in volume are Berlin, Stockholm and Helsinki-Uusimaa. In spite of the size, based on the quality, one of the top performing science-hubs is Aarhus. Some of the others are Tallinn and Riga regions. Their approach shows willingness to commit to a science and technology driven strategy that pushes forward the innovation capacity of the region and guarantees competences in the crucial areas of top expertise. While the science and technology driven approach is common, each region will benefit from linking their innovation capacity with the regional traditional strengths.

Most capital regions do indeed fall in the science and technology driven category of regions, the other regions like with ports and logistics benefit from linking the high-end research and science driven priorities with the locally grounded industry in their regions as Asheim, Isaksen & Trippl (2019) propose. By upgrading and/or technologically improving locally grounded industries it is possible to link less performing regions to global high-tech competence centres.

A closer look at Helsinki-Uusimaa and Berlin/Brandenburg shows, how top education and research institutions are working together. There are some similarities between the Helsinki-Uusimaa and Berlin/Brandenburg regional approaches to innovation, but also some differences. The similarities include that the capital region attracts institutional collection of scientific and technology related economic activities, which originate from universities and research centres. These collections represent either public and/or private sector investments. In spite of some similarities, the differences between these two regions are administrative and level of focus on entrepreneurship and internationalisation. In case of the Helsinki-Uusimaa, the cities of Helsinki and Espoo have the with distinct educational and research institutions like Helsinki and Aalto University and VTT - Technical Research Centre of Finland. About the corporate presence, the region has a significant distribution, between Helsinki, Espoo and Vantaa. While Helsinki, Espoo and Vantaa with international airport are administratively part of the same region, the regional strategy takes into account the differences of knowledge nodes and spaces that specifically impact innovation locally in each city's socio-economic as well as educational and research environment.

In Berlin/Brandenburg we have the collection of science and research in the capital Berlin and in Potsdam, which includes the Potsdam-Golm Science Park. Brandenburg and Berlin are administratively two individual partly sovereign states of the German federation with the socio-economic differences. The cross-state innovation strategy innoBB is a remarkable step towards a dynamic evolution and transformation. This joint InnoBB strategy combines the two separate federal

states strategies and delegates the implementation to industrial clusters. Berlin/Brandenburg joint innovation strategy innoBB 2025 clearly mentions five clusters like energy, transport, ICT, healthcare and optics & photonics that will drive excellence in innovation through cluster collaboration and collaboration between the two federal states. The strategy signs the clusters to implement the thematic priorities like digitalization, real world labs, work 4.0 and start-ups into action. The joint strategy notably allows two high-level science and technology conglomerations, Berlin and Potsdam, to collaborate closely in science-driven innovation. In practical terms, we may conclude that commitment to utilising top level science and technology organisations as key to economically transform a region through innovation is present in both regions.

As an example, the responsibility of smart specialisation strategy in Midtjylland is given to the Danish Executive Board for Business Development and Growth, which means that businesses, clusters and innovations are the national cross-cutting priorities. Due to the fact that cluster organisations have traditionally been strong and proven in terms of efficiently driving the economy, selected industrial clusters form a new cluster landscape. Open and cross-cluster collaboration will be vital to succeed in innovations.

The science and research driven strong hubs in any of the studied regions show at first the importance of funding and competencies accumulation before the new innovations and solutions will be the growth motor of the region and transform the region economically. The Smart Specialisation strategy work visibility and engagement of all stakeholders is the key success factor for regional development. In the following, we will analyse deeper the regions, which focus more on local territories and industry.

Strategy Focused on Logistics and Local Industry

This analysis includes a geographical location that strategically relies on logistics and favours the development of logistics-related activities like cities with harbours. Interestingly, these regions do not anchor solely their smart specialisation strategy around in maritime industry and logistics. Strategically these regions emphasize linking logistics and the maritime sector to the digitalisation and new innovative technologies and economy. Assembling research and technology around the node of transport, logistics and maritime related industries enhances the opportunities of leveraging local knowledge networks as well as international links.

This is the case in the regions comprising cities like Riga, Liepaja, Vilnius, Klaipeda, Gdansk, and Kotka. The presence of a harbour and other logistical nodes does not mean these regions cannot perform in other areas, but logistics-related areas are the strength and can be leveraged. The link to logistics, energy, and construction with new technological and research driven solutions provide entrepreneurial opportunities.

The position on the Innovation Index (RII) offers several possible focus areas to prioritize regional research and innovation investments on areas distinctly rooted in the regional logistic advantage. Gdansk/Pomorskie is a good example for this constellation. Pomorskie has a growing knowledge-intensive services sector focused on ICT and substantial business process outsourcing and shared service centres activity, driven in particular by inward foreign direct investments based on OECD study, 2019. Based on this, the region can link the innovative technologies and digitalisation to the long-standing logistics, maritime and shipbuilding. This help the region to transition into areas such as renewable energy, biotechnology, food, the silver economy, tourism, and the automotive industry.

The strategy stories of Estonia, Latvia and Lithuania present the alignment of the Smart Specialisation strategy with the national programme of economic transformation. In the case of Estonia, the success in the Tallinn and Tartu, with their innovation, science and technology and industry drives the development. While science-based clusters arise and grow mainly in capital regions, a positive impact in the peripheral areas requires local circulation and exploitation of knowledge and know-how to the create local practical innovations and solutions.

The Kymenlaakso region in Finland supports that Smart Specialisation strategy can lead to opportunities for local companies to excel in innovation in a highly competitive environment. Smart Specialisation has been essential for Kymenlaakso as a region situated close to the Helsinki capital region, forced to compete for expertise.

As an example, January 2020, Kotkamills Oy entered into a significant cooperation agreement with Lavazza Professional with disposable cups made of plastic-free cardboard made by Kotkamills in Kotka in its beverage vending machines serving hot drinks all over Europe.[50] In addition, UPM Kymmene Corporation is investigating the construction of Finland's largest biorefinery in the port of Mussalo in Kotka. The investment decision is expected to be made during 2020.[51] In February 2020, Fintoil and the Port of Hamina-Kotka agreed to erect a new crude tall oil (CTO) biorefinery in the chemical port in Hamina. Crude pine oil production is scheduled to begin during 2022.[52] Finland Minerals Group is investigating the location of two battery material factories to manufacture lithium-ion batteries in Kotka and Hamina to support the electrification of traffic and aiming at curbing climate change.

Kotka/Kymenlaakso research-industry collaboration leads to fruitful entrepreneurial results when combining local long-standing skills with research and technology. Kymenlaakso's innovation ecosystem is expanding and being restructured to answer the need in new innovations in the circular economy, bioeconomy, cleantech and the climate change. Several new business investments and developments in the year 2020 and following years confirm how local specialisations can be restructured through collaboration and can hook into larger value chains responding to future demand.

St. Petersburg strategy states that one of the priorities of the industrial policy of St. Petersburg is to promote the development of clusters and the creation of paths towards new cluster formations. Also, St. Petersburg established the centre for cluster development of St. Petersburg to coordinate the activities of clusters with scientific institutions, public authorities, investors, research centres, as well as to assist in obtaining state support for clusters.

Summary of Analysis 2 – Regional Smart Specialisation Strategy Stories

This second cross-case analysis derives from the strategy stories analysed show that regions are different how they strategically drive innovation and economic growth. Regions driving forces may be either 1) Innovation, Science and Technology or 2) logistics and local Industry. Some of the regions rely heavily on industry collaboration and clusters or ecosystems. Some of the regions prioritize and focus, some of them diversify.

These different approaches may depend on the government structure history, socio-economic developments, and the geo-economic space the regions inhabit, as well as the extent to which local industry and SMEs are taken into consideration.

The strategy stories disclose differences in the efforts towards clearly identifying selected areas of priority or attempting to support a wide-ranging regional profile which results in a diversified strategy which may give reason for careful monitoring and updating in future revisions.

While research-industry collaboration is recognized as highly relevant in smart specialisation contexts, there are differences on how regions include that in their strategies. Importantly, while collaborative strategic may include the utilization of industrial clusters or ecosystems, research-industry collaboration rests on a more inclusive understanding of a broad range of stakeholders and plays out the dynamics needed in research-industry collaboration for a successful innovation-led regional transformation.

50 https://kymensanomat.fi/uutiset/lahella/334f0b23-9e89-452e-a5af-813468942e5c; https://kotkamills.com/kotkamills-ceo-markku-hamalainen-is-pleased-about-the-collaboration-with-lavazza-professional-we-share-a-goal-to-substantially-increase-recycling/

51 https://kymensanomat.fi/uutiset/lahella/4c93aec2-d690-4203-b9b4-f96de7fbe308; https://www.upmbiofuels.com/whats-new/news/2018/10/environmental-impact-assessment-for-upms-possible-kotka-biorefinery-is-ready/

52 https://kymensanomat.fi/uutiset/lahella/6d8c787b-cde6-456f-8bde-026127ba4314; https://bioenergyinternational.com/biofuels-oils/fintoil-to-invest-eur-100-million-in-new-biorefinery-in-finland.

Based on the strategy stories in this study we can observe that some regions have specified industrial clusters or ecosystems as being key for the strategic development and implementation and towards securing competitiveness. In some regions industrial clusters may play a vital role in implementation and they are trusted to function as driving force for innovation-based research-industry collaboration.

4.3 Analysis 3 – Responsibility in Smart Specialisation Processes

The responsibilities to initiate and conduct the Smart Specialisation strategy creation and revision process vary across regions.

In the Denmark there has been a shift of responsibilities of smart specialisation through the restructuring of the business support system at national level. The key actors behind the regional development strategies and regional growth were until 2019 Regional Growth or a and a National Growth Council, which was replaced by a national board, the Danish Executive Board for Business Development and Growth. The move to a centralised way to govern business support of the five Danish regions by removing the responsibility from the regions, may have an impact to smart specialisation strategies. The new national strategy does present the restructuring as a decentralised policy. Interestingly, clusters are mentioned in the new strategy, which could indication that clusters will have some responsibility of maintaining local coherence, and perhaps cross-regional activity within specific clusters. The role of the City of Aarhus has been of importance already before the new national strategy, the removal of the regional level in economic development may lead to an increased effect of the responsibility of the City in integrating the national course with the local strengths and needs. The region of Midtjylland has de-facto practices in Smart Specialisation and has received European Regional Development funding.

Tension between national and regional responsibility are present in several other countries although the relationship between government and regional level actors may vary. In Sweden for example Smart Specialisation is well orchestrated nationally which facilitates Smart Specialisation implementation in most regions except for the capital region of Stockholm. The imbalance is due partly to the relatively more privileged position of the Stockholm region in terms of available resource, capital and funding, but also due to Stockholm not choosing to go the Smart Specialisation way. In this case the disparity in Smart Specialisation responsibility between the rest of the nation and the Stockholm region has developed organically, rather than through tensions between the objectives defined through different levels of economic development institutions and actors.

In Latvia and in Estonia the strategy stories clearly show that national government is the main actor in smart specialisation strategy and processes. The centralised processes related to Smart Specialisation, choosing growth areas, policymaking, policy implementation was led by two ministries, the Ministry of Education and Research (MER) and the Ministry of Economic Affairs and Communications (MEAC) and the Estonian Development Fund was involved to enhance industry-research cooperation. The regional perspective was largely neglected, and Estonia's Smart Specialisation is mostly focussing on high-tech sectors. Therefore, most of the research, development and innovation funding is channelled to areas with a concentration of science and technology, such as Tartu and especially the Tallinn area. Since Tallinn can be considered the main driver of innovation in the country a national approach benefits Tallinn and the city is given the responsibility as a motor for the country's success. While Estonia as a country shows good results in turning performance up, this does not necessarily translate in prosperity for all parts of the country.

In the case of Latvia Smart Specialisation strategy corresponds to a national research and innovation strategy for economic transformation. The national government acts through the Ministry

of Education and Science of Latvia (MoES) and the strategy story presented in this study conveys a strong and predominantly national vision for economic transformation. However, as stated in the strategy story the intention through the focus on „Growth of the National economy" is to provide an example of the coupling of Smart Specialisation strategy with the National Development Plan. It is not clear how the local/regional responsibilities for Smart Specialisation are integrated into the nationally set objectives.

Lithuania has been able to create a balance between the two levels of governance by assigning the responsibility of Smart Specialisation coordination to a dedicated governmental agency, MITA, the Agency for Innovation, Science, and Technology. The operationalisation of Smart Specialisation at the stage of strategy creation as wells as at the implementation stage have been the responsibility of MITA. MITA also provides consulting to economic entities, hires experts and ensures coordination of Smart Specialisation strategy priorities through budgetary means. The agency operates both at high strategic level as well as in engaging citizens and local SMEs. Due to its success the agency has recently been granted increased resources and its responsibility is being extended.

The responsibility for Smart Specialisation resides mainly with local/regional actors in the two Finnish regions in the study, as well as in the Pomorskie-Sopot region in Poland. It is worth noting that the five Finnish large regions have created an informal forum to exchange Smart Specialisation experiences. This has not been initiated through national level coordination, but it reflects the need to share ideas among the local/regional actors that carry responsibility for Smart Specialisation and economic development.

In Poland the Pomorskie Regional Development Strategy according to the Smart Specialisation principle was generated by the Self-Government of the Pomorskie Region. In addition, the strategy was also integrated into the provisions other specified local strategies and budgetary provisions, the "Pomorskie Creativity Port" Regional Strategic Programme for Economic Development and the Regional Operational Programme. The Self-Government of the Pomorskie Region supports the development of Smart Specialisation priorities on many levels.

St. Petersburg is implementing regional development processes resembling Smart Specialisation, though the process may not be fully comparable as it is not part of the European Union as well as being larger in size than the other Baltic Sea regions. In terms of responsibility, St. Petersburg's strategy and implementation are local/regional. Both Germany and Poland, counting 16 states or regions each, assign responsibility of Smart Specialisation to the regions. In the case of Berlin/Brandenburg the responsibility is shared between two independent states which is done by a joint innovation strategy in order to achieve coherence between two territories boasting high levels of concentration in technology and science-based activities. Interestingly, the joint innovation strategy of Berlin/Brandenburg mentions clusters with regard to implementation, thus clusters seem to have some degree of implementation responsibility in the region.

The study observes that strategy stories may vary in their scope and focus and may have different challenges based on the responsibility, ownership or phase of the strategic processes. While in some of the regions Smart Specialisation strategy has led to a high level of focus and the other territories occupy a wider diversified strategy.

All regions have indeed increased prioritization through the process development. The smart specialisation monitoring and support structures has helped the regions to gain direction based on their strengths. This has helped to differentiate and supports the validation of choices and decisions to make the region competitive. The too diversified strategies may encounter difficulties in the implementation and monitoring phase.

The strategy stories of Latvia and Lithuania shows that the revision process has helped them in reducing the priorities from highly diversified to multi-focal approach. Lithuania consolidated twenty priorities into six of thematic approach, which helped the region to flourish. As another example, Helsinki-Uusimaa region just renewed their strategy based on resource wisdom and with the priorities of climate neutrality, citizens city and industrial modernisation.

Some of the strategies are diversified, such as Midtjylland, Stockholm, and St. Petersburg. As an example, Midtjylland has been able to strengthen its position as an innovative region by diversifying. This requires the region and the city to balance between a regional focus and a broader national approach in order to be able to create synergies and successful regional projects in attracting businesses. In regions like Stockholm where Smart Specialisation strategy is not actively utilised, in the long run will benefit from adopting Smart Specialisation aspects to sustainably govern regional innovation through stronger prioritisation. Strategic focus also relates to stakeholder involvement, process leadership, and cross-regional collaboration. From a perspective of macro-regional adjustments, the process of smart specialisation strategy is ideal as a means to support businesses in selected priorities and allow cross-regional synergies to enhance the innovation potential.

Summary of Analysis 3 – by Responsibility Distribution in Smart Specialisation Processes

This section has examined where the responsibility for strategy creation and implementation lies in the region or national level. Smart Specialisation processes reveal differing roles in the regions between regional actors and national actors having the responsibility to drive economic development.

The responsibility resides mainly with national level actors in Estonia, Lithuania and Latvia, and at regional level in the Finnish regions, Stockholm and in Pomorskie-Sopot in Poland. The specific feature of the Lithuania's Smart Specialisation strategy and implementation is the responsibility of an assigned agency, which combines both regional and national perspectives. At other specific feature is that Stockholm is not actively participating in the Smart Specialisation approach to regional development. In addition, St. Petersburg is committed to implement stakeholder involvement even without being part of the European Union.

Denmark's new decentralised system which is run by a central national board has recently removed responsibility for economic development and business support from its five regions.

Overall, it can be concluded that Smart Specialisation strategy creation, revision, and implementation can easier integrate a multi-stakeholder approach that nurtures dynamic action when the responsibility is regional. This can be seen both in the Finnish regions, as well as in the action driven development of cities like Aarhus, Tallin, and Gdansk. The hybrid model of Lithuania, where economic development and innovation is delegated to a governmental agency with the capacity to integrate local, multi-stakeholder processes, equally can be categorized as action driven. On the other hand, a nationally led process may run the risk to disregard valuable input from regional stakeholders and may miss opportunities to foster directs paths for collaboration between regions.

4.4 Analysis 4 – Balance in the Regional Strategy Diamond

In the following section, we analyse and compare the regions based on their Regional Strategy Diamonds. The benefit of the Regional Strategy Diamond lies in the opportunity to evaluate the balance between the different five angles – strategy: what do we say, competitiveness: how do we win, actions: what do we do, competences: what do we have and culture & leadership: how do we lead - in each of these regions. The balance is essential for the economic transformation. In this analysis, we compare and illustrate the diversity in each of these regions in the Baltic Sea based on their Strategy Diamonds.

The cross-regional approach to the angles may trigger dialogue between regions and assist in activities that can lead to a smart, inclusive, and sustainable economic development and cross-regional opportunities. The intention is to show the diversity. We analyse, the regional strategies

based on - what do we say - in their strategies. All the analysis is listed in the previous chapter.

First general comments about the strategies, some of them are pivoting around a capital region, and they may either have too big reliance on the capital city, or they may disregard of outside territory of the capital city. Many have unfounded 'me-too' approach to strategy, and they seem to envision similar goals as other regions, but lacking talent or focus to make it happen.

The Smart Specialisation strategy stories in the various regions differ in terms of focus and in how they handle the strategy with regard to a multi-level governance or multi-focal diversified approach. Some regions lack focus and rather express a wish to join and want a piece of the action in several areas. This results easily that it is hard to compete with a clear competitive advantage. Therefore, we advise for a bit more focused approach. The size of the region can have a significant impact, but whether a region is inward or outward looking or local or international is not linked to the size. Rather, you make a difference with public-private collaboration, even international, directed to societal impact and boost of the region.

Then we analyse the competitiveness of the regions, and - how do we win. Generally, we may analyse the competitiveness through international focus or enhanced domestic demand and efforts. Ultimately international relevance is drawn from a strong local base and a willingness to participate in the global knowledge economy. The two forces are the globally available scientific and technological knowledge, and local, know-how and competence. The Smart Specialisation strategy stories indicate that there may be a tension between them. However, a balance of these two forces needs to be obtained and most regions benefit from enhancing collaboration and creating a broad scope of keeping in mind the value of cross-regional potential.

Then, to the analysis of competences – what do we have- and what do we need to obtain in future. Most regions acknowledge the importance of competences, however the needed expertise for the region requires intentional strategic goal setting and continuous upgrading. Safeguarding a constant influx or breeding of competences is a crucial pre-requisite for the successful execution of an economic transformation and it is not yet obtained in the majority of the regions. Therefore, it is crucial to pay attention to the balance of the angles in the Regional Strategy Diamond to tackle competence isolation, brain drain, and/or attracting talents, as well as addressing the need of possibly solving all three issues. In some cases, it may be necessary to introduce a discussion around skills and capabilities when strategies do not safeguard competences.

Securing the competences that are needed for strengthening the chosen spearheads is the outcome of collaboration between institutions within a region, across regions, and internationally, which was observed in the two previous angles already. Every region needs to put this aspect in perspective with their own variations of angles when revising the strategies. So, it is a context specific, so there are no formula that fits to all. However, a cross-regional dialogue may be advantageous in adjusting a regional balance and keeping an outward looking perspective, that may otherwise be missing.

At then to the strategic actions – what do we do- is that in line with what do we say. Some regions are still in the initial process of a culture to push for action, while others have experienced that collaborative activities breed new action at all levels and can be sustained by multi-level governance. In all regions, some bottlenecks do appear in actions. Estonia is showing a very high level of action. Nearly all regions need to improve the alignment between public and private sector actions. Some regions have already taken decisive steps that have led to a range of successful achievements, requirements such as coherence, strategic focus, and collaboration are yet to be put into action. One example is to boost the industry joint programs and entrepreneurship and start-ups to secure momentum.

Although some regions have a higher level of activity, no region or actor within a region, is exempt from having to continuously secure momentum. The peculiarity of this action angle is that on the one hand it can be the result of all the angles working together, on the other hand it can function as the motor for adjusting the balance of the strategy diamond.

Then in the last, but not the least - how do we lead. The way the Smart Specialisation strategy is

used to lead the regional economic transformation has differences. Approaches vary from centralized to decentralized constellations, to organic leading processes, to pragmatic adaptation, to reliance on industrial clusters for implementation. Collaboration takes place easier and more efficiently in smaller regions. Larger regions need to deal with distance and try to avoid the intricacies of multi-level governance. In the example of Latvia tensions between national and regional levels may be more apparent, but each region finds itself in the process of balancing quadruple helix, balancing place-based economic transformation with national economic goals, and the way they lead not only depends on their regional strategy experiences, but also on their governance set-up. Denmark has just centrally introduced a decentralized approach without a regional dimension. Estonia due to its size also does not have a regional outlook. Berlin/Brandenburg has a formalized cross-state collaboration framework. Lithuania has a clearly identified actor with the responsibility for Smart Specialisation, St. Petersburg has assigned committees. How these different approaches will be instrumental and successful and prompting and leading collaboration will be experienced in the implementation process and the balancing out of all angles.

One key concept that summarizes the observations on the angle of culture & leadership is once again collaboration. In addition to collaboration, other key concepts worth noting are the synchronisation of actions, eliminating dependences that block power relations, work out tensions, leverage organic developments.

Smart Specialisation strategy can generally be seen as a benchmark to leadership approaches and the application of monitoring systems. While data-based methodologies are applied in several regions, the power distribution in leading the strategic process can include authority conflicts, fragmentation of impulses, and lack of coordination, and reduce the efficiency of the strategy.

Summary of Analysis 4 – Balance in the Regional Strategy Diamond

This section provides an overview of the cross-case analysis of the balance of Regional Strategy Diamond's five angles - what do we say, what do we do, what do we have, how do we compete, and how do we lead. These all five angles need to be in balance in each and every region to be successful in smart specialisation strategies and implementation, which also allow a comparison across the regions.

From an individual region's point of view, the benefit of the Regional Strategy Diamond lies in the opportunity to evaluate the balance between these different five angles. If there is no balance, then the corrective actions need to be taken. The beauty of this analysis tool is that it is continuous and can be applied in all levels. Based on cross-case analysis, it is evident that the studied regions differ in many ways. The power of the Regional Strategy Diamond analysis lies in the fact that each and every region should achieve the balance internally with their own selected way and to move towards a successful cross-regional collaboration.

The way the regions compete includes a balance in the attitude towards their internationalisation and outward looking position. Ultimately internationalisation is drawn from a strong local base and a willingness to participate in the global knowledge economy. The Smart Specialisation strategy stories indicate that there may be a tension between global and local approaches. The regional strategy diamond analysis will help in branching into new industrial paths with the help of international collaboration. Most regions benefit of enhancing continuous international collaboration and creating a broad scope of locally strengthened interlinked priorities and businesses with cross-regional potential.

The size of the region can have a significant impact. However, if a region is inward or outward looking is not linked to the size. Rather, you make a difference with public-private collaboration, even international, directed to societal impact and boost of the region.

Securing the competences that are needed for strengthening the chosen spearheads is the

outcome of collaboration between institutions within a region, across regions, and internationally. Every region needs to put this aspect in perspective with their own variations of angles when revising the strategies. A formula that fits all is not the solution. However, a cross-regional dialogue helps in adjusting a regional balance and keeping an outward looking perspective, that may otherwise be missing.

Although some regions have a higher level of activity, no region or actor within a region, is exempt from having to continuously secure momentum. The peculiarity of the strategic action angle is that on the one hand it can be the result of all the angles working together, on the other hand it can function as the motor for adjusting the balance of the strategy diamond.

Smart Specialisation strategy can generally be seen as a benchmark to leadership approaches and the application of monitoring systems. While data-based methodologies are applied in several regions, the power distribution in leading the strategic process that can include authority conflicts, fragmentation of impulses, and lack of coordination, and reduce the efficiency of the strategy.

A balance among the five angles of the Regional Strategy Diamond is, for each region, a pre-requisite for inter-regional collaboration and economic transformation in the macro-region as a whole.

4.5 Concluding Remarks on the Analysis

This cross-case analysis was based on the ten Smart Specialisation strategy stories analyses of the ten participating Baltic Sea regions by:

1. regional scoreboard innovation indicators,
2. smart specialisation strategy stories,
3. responsibility distribution in smart specialisation processes and
4. regional Strategy Diamond balance.

The first cross-case analysis focuses on the regional scoreboard innovation indicators. As the Regional Innovation Index (RII) describe the innovation capacity of a region, six criteria -Lifelong learning, Innovative SMEs collaborating with others, Public and Private R&D expenditures, SMEs innovating in-house, Non-R&D expenditures - were selected to be applied to all regions in this study as having significance for the Smart Specialisation strategy. This approach was taken in order to illustrate the balance between regional key actors in Smart Specialisation and potential openings for cross-regional actions. Indicators were chosen that symbolize collaboration by including wider sectors of society and factoring in SME activities that are complementary to knowledge-heavy dimensions such as high-level research for science-based technological innovation.

The analysis offers the deeper understanding of the regions based on their positioning on the innovation scale and on the significance of the changes within a set of indicators specifically relevant for that region. This study offers the deeper understanding of importance of learning, learning regions, innovation funding and entrepreneurial spirit.

The second cross-case analysis derives from the strategy stories analysed show that regions are different how they strategically drive innovation and economic growth. Regions driving forces may be either 1) Innovation, science and technology or 2) logistics and local industry based. Some regions rely on industry collaboration and clusters/ecosystems. Some of the regions prioritize and focus, some of them diversify. These different approaches may depend on the government structure history, socio-economic developments, as well as the extent to which local industry and SMEs are taken into consideration.

The third perspective examines the responsibility for strategy creation and implementation lies in the region or national level. In each of these cases the processes, roles and ambitions reveal to be different even though the purpose is to drive economic

development. In general, the responsibility resides in national level in Baltics like in Estonia, Lithuania and Latvia. In other Baltic Sea countries, like in the Finnish, Swedish, Polish and German regions the responsibility is regional. Lithuania represents a hybrid model through a governmental agency. As a conclusion, the Smart Specialisation strategy creation, revision, and implementation with a multi-stakeholder collaboration nurtures dynamic regional actions and success in driving the economic transformation, when the responsibility is regional.

The fourth cross-case analyses highlight the balance of the five angles of the Regional Strategy Diamond. The cross-analysis concludes that from an individual region's point of view the benefit of the Regional Strategy Diamond lies in the opportunity to evaluate the balance between these different five angles. If there is no balance, then the corrective actions need to be taken. The beauty of this analysis tool is that it is continuous and can be applied in all levels. Based on cross-case analysis, it is evident that the studied regions differ in many ways. The power of the Regional Strategy Diamond analysis lies in the fact that each and every region should achieve the balance internally with their own selected way and to move towards a successful cross-regional collaboration.

To summarise, successful smart specialisation strategy creation and implementation requires a transition towards international collaboration and economic transformation of the regions.

In the following chapter the key findings are discussed and summarised in order to show opportunities in regarding of economic transformation in the future.

5 FINDINGS AND DISCUSSION

5 FINDINGS AND DISCUSSION

The motivation for this study was to study the Smart Specialisation strategy creation, revision and implementation processes in the Baltic Sea Region with assumption that it may not be as homogeneous as previously thought to be in all countries and regions in the Baltic Sea. At first glance, the Nordic countries may be seen rather homogenous and this may create expectations. However, our cross-case study shows that Smart Specialisation strategy processes, responsibilities, implementations, and the experiences vary from region to region. This is due to national differences in the institutional set up and governance history of the country, as well as the geo-political landscape of the region in question. Another crucial factor lies in the role of operationalisation and innovations of smart specialisation strategies, which reflects to economic transformation of the region. As stated by Larosse & et all 2020, 'Building further on triple helix and cluster approaches, smart specialisation is thus an ongoing methodology in managing economic transformation involving a wide range of stakeholders beyond an industrial forum.

In a line with our studies, the State of the Nordic Region (2020) report signalizes that there is not a specific Nordic model available, even though the Nordic innovation environment is highly competitive and compatible with the Smart Specialisation. In other words, this will be future potential for Nordics. Baltic Sea Macro region has a large range of regional variations to Smart Specialisation approaches. This study suggests increased cross-border collaboration and process for a cross-regional capacity building towards economic transformation. This study concludes that 1) economic transformation is not yet reality, 2) there are slowly emerging attempts to use Smart Specialisation for SDGs implementation and 3) cross-regional collaboration is still far from being the norm in smart specialisation strategy creation and implementation in Baltic Sea Region.

5.1 Key Findings

This study is based on regional Smart Specialisation strategy stories and analysis that mirror the impact of Smart Specialisation strategies in context of Baltic Sea Region. This study shed the light on the status of Smart Specialisation strategy creation, revision and implementation in the Baltic Sea Region towards economic transformation.

The regions around the Baltic Sea, are distinct in many ways in their strategic intent and implementation and vary from top performing innovation environments, to harbour cities, to logistic hubs, to digital hot spots, to smart city settings, to rural and forest industrial nodes. Smart Specialization as a concept is used with varying degrees of strategic prioritising, commitment, and alignment to local or national strategies and are applied in a wide range of diverse public-private collaboration.

The strategy stories as reflected in each region's context and analysed through the lenses of the Regional Strategy Diamond illustrate the regions' ability to adapt Smart Specialisation experiences within their place-based, regional or national restructuring process. The findings show a portrait of how the smart specialisation strategies and regional innovation system affects the economic transformation of Baltic Sea. The results could be used for the next EU period 2020-2027.

The results of the study also show to what extent key elements of Smart Specialisation strategy creation are tied with either regional or national development processes. The analysed strategy stories demonstrate that the multi-level political ownership and stakeholder involvement of Smart Specialisation prove to be valuable to address issues like fragmentation and weak links between business and research.

Overall, the study finds that in Baltic Sea Region the Smart Specialisation concept is essential in bringing focus to the strategic intent and vision of the

regions and that Smart Specialisation strategy has a role in economic transformation. The study finds that through Smart Specialisation implementation, innovation is intertwined into the socio-economic fabric of the regions and focus towards future opportunities. However, this focus and prioritisation as proposed by Smart Specialisation is not achieved without monitoring, reflection, evaluation and resetting strategic priorities in an ongoing process. A progression has achieved after the regions have undergone a revision process.

The findings of the study with respect to the inter-regional prospects show a lot of future potential. Cross-border collaboration has not been the focus of Smart Specialisation. Smart Specialisation's potential for economic transformation through cross-regional collaboration is a future potential.

In addition, the role of Smart Specialisation as a means of the Sustainable Development Goals implementation requires further actions, even though many aspects of SDGs are already prioritised in the regional strategies otherwise. Some regions like Helsinki-Uusimaa consider Smart Specialisation as a prospective tool for the implementation of Sustainable Development Goals, which include future opportunities for economic transformation.

The findings from strategy stories emphasize the importance of harmonising the local vision and the outlook of strategic actions and suggest alignment, reflection, readjustment, refocussing and continuing fine-tuning processes. One of the insights of this study is that the content of Smart Specialisation strategies and innovation performance seems to be linked together.

The Smart Specialisation strategy overview confirms that the there is no one solution that fits for all. Vice versa, we may say that smart specialisation strategies and success is - context dependent when transforming the regions into smart regions. Innovation and smartness need to be related to the regions specific spatial, infrastructural and socio-political contexts in other words to the place-based approach. In the following the findings of the cross-case analysis are summarized. This cross-case analysis was based on the ten Smart Specialisation strategy stories analyses of the ten participating Baltic Sea regions by: regional scoreboard innovation indicators, Smart Specialisation strategy stories, Regional Strategy Diamond balance, and responsibility distribution in Smart Specialisation processes.

Insights of Cross-Case Analysis of Regional Innovation Indicators

The first cross-case analysis focuses on the regional scoreboard innovation indicators. As the Regional Innovation Index (RII) describe the innovation capacity of a region, six criteria -Lifelong learning, Innovative SMEs collaborating with others, Public and Private R&D expenditures, SMEs innovating in-house, Non-R&D expenditures - were selected to be applied to all regions in this study as having significance for the Smart Specialisation strategy. The analysis offers deeper understanding of the regions based on their positioning on the innovation scale and on the significance of the changes within a set of indicators specifically relevant for that region. This study offers deeper understanding of importance of learning, learning regions, innovation funding and entrepreneurial spirit.

Insights of Cross-case Analysis of Strategy Stories

The second cross-case analysis tackling the type of strategy responses looked into how the Baltic Sea regions set up their Smart Specialisation processes in order to strategically drive innovation and economic growth. Regions' driving forces may be either 1) Innovation, science and technology or 2) logistics and local industry based. Some regions rely on industry collaboration and clusters/ ecosystems. Some of the regions prioritize and focus, some of them diversify. These different approaches may depend on the government structure history, socio-economic developments, as well as the extent to which local industry and SMEs are taken into consideration to new industrial paths and cross-regional collaboration.

Insights of Cross-Case Analysis of Responsibility

The third perspective examines the responsibility for strategy creation and implementation lies in the region or national level. In each of these cases the processes, roles and ambitions reveal to be different even though the purpose is to drive economic development. In general, the responsibility resides in national level in Baltics like in Estonia, Lithuania and Latvia. In other Baltic Sea countries, like in the Finnish, Swedish, Polish and German regions the responsibility is regional. Lithuania represents a hybrid model through a governmental agency. As a conclusion, the Smart Specialisation strategy creation, revision, and implementation with a multi-stakeholder collaboration nurtures dynamic regional actions and success in driving the economic transformation, when the responsibility is regional.

Tension between national and regional responsibility for Smart Specialisation are present in several regions and countries although the relationship between government and regional level actors varies considerably in the Baltic Sea Region. In Sweden for example, Smart Specialisation is well orchestrated nationally which facilitates Smart Specialisation implementation in most regions; yet the capital region of Stockholm does not subscribe to Smart Specialisation approach. The imbalance is also partly due to the relatively more privileged position of the Stockholm region in terms of available resource, capital and funding. This is an example where the disparity in Smart Specialisation responsibility between the rest of the nation and the region has developed organically, rather than through tensions between the objectives defined. A discrepancy between different levels of economic development institutions and actors can be found in the Danish example, and in how the Baltic countries - Estonia, Latvia and Lithuania- lead economic development and business support systems at national level. Denmark's new decentralised system which is run by a central national board has recently removed responsibility for economic development and business support from its five regions. Lithuania represents a hybrid model through a governmental agency while Finland, Germany and Poland Smart Specialisation strategies are devised and implemented regionally and locally. The local approach of St. Petersburg as a large city region is in close alignment with the national priorities.

Overall, it can be concluded that Smart Specialisation strategy creation, revision, and implementation can easier integrate a multi-stakeholder approach that nurtures dynamic action when the responsibility is regional/local.

Insights of Cross-Case Analysis of Strategy Diamonds Balance

The fourth cross-case analyses highlight the balance of the five angles of the Regional Strategy Diamond. The cross-analysis concludes that from an individual region's point of view the benefit of the Regional Strategy Diamond lies in the opportunity to evaluate the balance between these different five angles. If there is no balance, then corrective actions need to be taken. The beauty of this analysis tool is that it is continuous and can be applied at all levels. Based on cross-case analysis, it is evident that the studied regions differ in many ways. The power of the Regional Strategy Diamond analysis lies in the fact that each and every region should achieve the balance internally with their own selected way and to move towards a successful cross-regional collaboration. Successful inter-regional approaches are achieved by an evaluation of actions which correspond to the strategy balance of the diamond angles.

To summarise, successful Smart Specialisation strategy creation and implementation requires a transition towards international collaboration and economic transformation of the regions.

5.2 Overview of the study

The motivation for this study was to study the Smart Specialisation strategy creation, revision and implementation processes in the Baltic Sea Region with assumption that it may not be as homogeneous as previously thought to be in all countries and regions in the Baltic Sea and in how they create a path to achieve economic transformation. The following research questions was raised:

1. How have Smart Specialisation strategies been created and implemented in the Baltic Sea Region?
2. What are the themes and content of Smart Specialisation strategies in the represented Baltic Sea Regions?
3. How can we position the Baltic Sea Regions' innovation performance by Smart Specialisation strategy and implementation?
4. How do the regions include inter-regional engagement in their strategy objectives?
5. How do Smart Specialisation strategies and processes drive sustainable and cross-regional economic transformation?

To first the question on how have Smart Specialisation strategies been created and implemented in the Baltic Sea Region.

This study examines the strategy creation and revision story around Smart Specialisation in ten regions in the Baltics Sea macro-region. The stories and their analysis examine facets of strategy work: measures of strategy creation, governmental and administrative processes, stakeholder engagement, monitoring, revisions and road mapping. Based on the studied regions this study confirms that involvement and actions of the stakeholders is essential for the success of the smart specialisation strategy creation and implementation. We need innovative approach to governance and quadruple helix context as well innovative technologies, solutions and collaborative actions.

In a place-based approach to economic transformation innovation and smartness are in fact related to their specific spatial, infrastructural and socio-political contexts inhabited by citizens and driven by local economy.

Furthermore, Some of the Smart Specialisation strategy creation, development, and revision has emphasis on citizen's services and some for services, high foster entrepreneurship and innovation and commercialisation or clusters/ecosystems and some both of those. Some regions target to competitiveness via innovation, science and technology and/or via societal impact related like improved quality of life and climate responsibility. Several regions present up-front strategic choices relating to citizens' quality of life, green initiatives, alignment with SDGs and so on. This approach is a as a necessity for regional economic transformation and towards building a community for inter-regional engagement. This vivid inter-regional collaboration is needed to successful transformation and strengthening as Baltic Sea as macro-region.

At second, what are the themes and content of Smart Specialisation strategy in the represented Baltic Sea regions.

The strategy stories with the strategic priorities as represented in the ten regions participated in the study are analysed below in table in Appendix. This illustrates how in some regions the strategy work is done independently from the national strategy, while in some regions economic development strategy follows closely the national prioritizing. Overall, climate and energy are present as priorities in all regions and a commonly chosen priority is bioeconomy, or biochemistry. In addition, health or medicine and ICT/ digitalisation related technologies are also listed in most regions.

Third, on how can we position the Baltic Sea Regions' innovation performance by Smart Specialisation strategy and implementation.

The studied regions with regard to innovation performance are measured by the European Innovation Scoreboard. The study finds that the

Baltic Sea regions are evenly spread within the range of performance levels. As shown in the analysis by innovation indicators in the previous chapter 4.1 the Baltic Sea Region is represented by top performing regions occupying top positions as - Innovation Leaders in the European Union. Another grouping represents the regions that are positioned in the middle of the scale at European average, performing relatively well as strong innovation leaders. A third grouping finds regions that are still below the European average as with a moderate innovation performance.

The grouping of regions which represent innovation leaders includes regions that have consistently acted within the Smart Specialisation concept of strategy creation, revision and implementation like Helsinki-Uusimaa and Berlin/ Brandenburg, but it also includes regions, such as Stockholm, that has gone a different path. Similarly, among the regions in the mid-range, strong and moderate innovators, there is some variety in how Smart Specialisation strategy and implementation has played a role in driving regional economic development. Midtjylland has followed a process that in practice is to a great extent in alignment with Smart Specialisation concepts, although this is not explicitly stated. The administrative changes and governance restructuring in Denmark will take the regional role further away from a distinct Smart Specialisation approach, but the role of Aarhus, the leading city in the region, will be crucial to balance out the current centralising approach.

Among the regions in the lower end of the scale Smart Specialisation appears to be a driving force for the regions to emerge as thriving markets. However, the governance structures have influence in how Smart Specialisation is in fact operationalised. Actions have been taken to clarify the focus of the economic drivers in these regions, and a clearer prioritizing will be beneficial in the future to lead these regions towards an improved position in innovation performance and in the overall economic transformation.

The variety of positionings among the regions means that across the Baltic Sean there exists a potential for growth through inter-regional collaboration. This has not yet been approached in a consistent way by the Smart Specialisation strategies. It is worth noticing that the trend in the moderately performing regions leads upwards, and this is a favourable premise to achieve results through inter-regional cooperation.

Fourth, how do the regions include inter-regional engagement in the strategy objectives.

Smart Specialisation strategy pushes for the need to communicate during the process of strategy creation. However, Smart Specialisation processes have not led to forming an overall cross-regional community, or collaborative communities through Smart Specialisation strategic choices. In the case of Finland, a community has emerged among Finnish cities around Smart Specialisation strategy and this is a remarkable evolution of informal gatherings and the wish to jointly tackle Smart Specialisation related issues. With respect to collaboration, formal or informal, a cross-regional perspective has largely been missing in the strategy stories. This applies to inter-regional engagement in several ways, it may not only include cross-border issues, but inter-regional aspects could also relate to cross-sector characteristics, or urban-rural perspectives, all of which are present in each of the represented regions.

A collaborative approach includes communicating regional strengths in a clearer way which leads to stronger regional identity and cross-regional collaboration. Therefore, new industrial paths including new cluster or ecosystem building and cross-communication between themes, and priorities are an important part of Smart Specialisation and place-based strategic outlooks.

While Smart Specialisation approach is a way to strengthen the focus, it is instrumental in governance and inter-regional collaboration. Stakeholders involvement and engagement tie the strategy work to local needs and demands. To include inter-regional and cross-regional actions may need specific targeted efforts, which may not yet have been emphasised in the Smart Specialisation strategy creation, implementation, and revision work.

The regional strategy diamond approach shows the importance of reaching balance between the action - what we do- and strategy - what we say- with other angles of competences - what we have- and competitiveness - how do we win- and culture

and leadership - how do we lead. This calls for inter-regional strategy objectives and inter-regional collaboration.

Fifth, how do Smart Specialisation strategy and process drive sustainable and cross-regional economic transformation.

To attract both international collaboration partners and funding some regions like Helsinki-Uusimaa, Stockholm, Tallin, and Berlin have a relatively clearly defined the regional strengths, however the majority of the Baltic Sea regions are still in the process of developing strategic focus in their own regional profiles. This implies further clarifying regional priorities, or alignments of regional and national spearheads. Based on regional place-based regional view, this could be a step towards a sustainable economic transformation.

To turn priorities towards the long-term strengths and consistent future opportunities is essential. As an example of Estonia, Latvia, Lithuania, and Midtjylland they point the need of pragmatically resolving differences in operationalisations based on conflicting multi-level governance patterns. The relation between regional and national policy in terms of Smart Specialisation strategy still remain a challenge in many cases. But for some regions, the revisions have re-affirmed that a common priorities and clear vision facilitate the allocation of funds and support available resources and give determined actors the playroom for action.

It is essential to bring businesses, industries, public sector and academia closer to each other for economic development. Even though, as an example of Berlin/Brandenburg where the cross-state strategy formalizes a transition to collaborative action, the active dialogue and exploration of actors is needed to make it happen. In relation to business clusters or ecosystems the approaches vary.

In conclusion, the three main challenges in Baltic Sea regions are: 1) the economic transformation based on smart specialisation is not yet to reality in the Baltic Sea Region, 2) the attempts of smart specialisation for SDG implementation are slowly emerging and 3) cross-regional collaboration is not a norm in the Baltic Sea Region. The findings of the study with respect to the inter-regional collaboration, economic transformation and SDG implementation show a lot of future potential, which will help regions in the transition to a more internationally regional innovation ecosystem and to cross-regional economic transformation.

5.3 Recommendations

As a response to Baltic Sea Region study, we shape an outlook towards regional economic transformation. The dynamics between science, society, and business have been transforming greatly under the pressure of serious societal challenges. Societal challenges are becoming more and more relevant to regional decision making and practically to the life of citizens.

As an example, the urgency to act against or even stop the climate change as a societal challenge attracts globally. This is due to successful scientific reasoning and technological solutions creation are communicated, understood, accepted and enacted by people. Active dialogue, inclusive innovation, and blending of knowledge are essential for the necessary momentum for action.

The Smart Specialisation strategy stories indicate that the dialogue around innovation and economic development as regional transformation is ongoing in the Baltic Sea Region, and where Smart Specialisation is taking place, reflected upon, revised and acted upon, it also results in remarkable developments which can lead for future opportunities and developments. For the Smart Specialisation the question arises whether these targets can be set at regional level or whether the action needs to be expanded cross-regionally.

Focus in Smart Specialisation Strategy Content

The Smart Specialisation process in these regions has not been as tightly focussed as may have been needed. Given the current need for an economic upturn in these regions, a broad spectrum of priorities may not lead to desired results. There may be an urgent necessity to retain jobs and expertise in these areas, and a perceived answer may be to secure the appeal of as many domains as possible. Yet, due to an existing lack of critical mass, a limited talent pool and brain drain with regard to top expertise may easily be the consequence.

However, in the revisions of the strategies the prioritization characterizing Smart Specialisation has been applied more strategically. The strategy stories indicate successes through integration and agility between the different angles and dimensions of the Regional Strategy Diamond. In contrast, expansion and restriction at the level of single angles in the Regional Strategy Diamond can serve in two different directions, to either strengthen or weaken the competitive advantage. It should be kept in mind, that multi-focal, broadly diversified strategies can bring elements of distraction and inconsistency which may hamper the possibilities inherent to a focused place-based Smart Specialisation.

Aligned Visions and Integrated Processes

The regional strategy process presented through the lens of the Regional Strategy Diamond underscores the importance of the integration of regional strategy and Smart Specialisation strategy. Integrating both processes can be seen as a recipe for success, as an alignment of visions secures willingness to act. Therefore, it is essential to have both alignment of vision and integrated processes in order to create a monitoring loop. Less favourable results, delays and diversions can then be tackled collaboratively. This could serve regions where national and regional objectives tend to drift apart. However, as Smart Specialisation is useful to clarify structural difficulties in promoting regional growth, it can provide a strategy process support to ensure growth opportunities through a transition to a green and sustainable economy utilising Sustainable Development Goals.

Continuous Smart Specialisation Process

Smart Specialisation strategy should be seen as a continuous process, and as a precursor for future policy-making practices. Not all regions in Baltic Sea Region have had equal chance to experiment, execute and evaluate the Smart Specialisation strategy process and its different facts. A cross-case study provide an incentive to consider Smart Specialisation from a long-term perspective and develop a continuity approach that might serve to trigger and align regional transformation. In addition, it is important to take into consideration that if the culture and leadership context are not supportive to Smart Specialisation collaborative action that may lag behind or not get off the ground. The result is that a collaborative strategic set-up is in constant danger of being offset by the difficulty to mobilize collaborative forces to act upon the strategic intent.

Action Acceleration with Scientific Excellence

The Smart Specialisation strategy stories emphasize the importance of putting into action the triple and quadruple helix approach. This means collaborative approaches with academia, industry, government and civic society. In most cases the economic transformation necessitates that academia and universities strive to become entrepreneurial and to make innovation and commercialization of academic research an integral part of the university governance and target setting. Competition to reach high academic and scientific achievements require heavy investment in human capital and infrastructure resources. On the structural level, this also means that science and innovation parks are being used to transition.

Although to different degrees, Smart Specialisation in the BSR strategy stories gives direction for action and functions as an enabling factor in terms of formulating a vision for action. The leading capital regions, but also smaller regions show that actions can be accelerated as a result.

Smart Specialisation is a crucial part of providing focus and intent that are necessary for action not to be dispersed. Thus, it can function as an accelerator not only to reach scientific excellence, but also to ignite and sustain action in industry, from industry, for and with civic society.

Place-based Global Outlook

The Smart Specialisation strategy stories in Baltic Sea Region surprisingly highlight the willingness to align the strategies and actions with the global societal challenges. Even though Smart Specialisation as a tool is defined for regional development and growth, it is equally relevant in global transitions like towards a green and sustainable economy as expressed in the United Nations SDGs and in the European Green Deal.

Macro-Region Collaboration

Taking into consideration the EU's strategic agenda, the Smart Specialisation strategy is a concept that can drive the growth of the Baltic Sea Region's states regarding their own resources or priorities. Some concerns have been raised that Smart Specialisation in the BSR states do not seem to bundle but rather create "national growth niches".

The study shows that the specific diversification in certain countries is rather broad and overlapping. Inevitably, this should lead to develop cross-regional collaboration at macro-regional level. At the same time, it is essential to retain the awareness that the Smart Specialisation has an element of entrepreneurial discovery, spirit and action that enables to mobilise the regional driving forces and create value.

Engaging Communities of Citizens

Based on the principle of open innovation, citizens or community engagement needs to be a norm in smart specialisation strategies. This means 1) identifying innovation possibilities through human-centred approaches combining innovation strategy and future trends forecasting across various industries with stakeholder engagement practices that include citizens in their diverse roles and securing sociocultural awareness in working with citizens, start-ups and multinational companies, providing the context for multi-governance activities, 2) working together with teams of policy makers, designers, engineers, artists to understand the human contradictions and potentials to develop collaboratively solutions that matter, and 3) providing strategic insights from a range of diverse organisations, from private sector to multi-nationals to start-ups to civic organisations, with the aim to translate this evidence-based approach into local, regional, and cross-regional Smart Specialisation goals and practices, leading to social innovations and socially responsible and environmentally viable market creation.

Specific innovation stimulation can happen with the creation of an accelerator model that includes space for start-ups and incorporates ways of opening high-tech and science to local people like through creating a meeting space, or by jointly using technologies like 3D Printing while sharing the space. With regard to innovative solutions it could also become increasingly attractive for industry to actively join and interact with the community with technology development for social innovation. The task is also to address how smart specialisation strategy could help to engage local people with the local associations and NGOs, and researchers/industry for testing environments and meeting spaces. Also, science and society should live next each other. The aspiration is to exchange experiences between Baltic Sea regions and help identity fruitful collaboration between innovation actors and residents as innovation stakeholders working towards socially and economically as well as environmentally sustainable solutions jointly.

Smart Specialisation as Tool for SDGs Implementation

The European Commission's Joint Research Centre (JRC) has been working with the United Nations to share the EU experience on Smart Specialisation (S3) strategies as one of the global methodologies helpful in achieving the SDGs, with a distinctive localised place-based approach in Europe. The target is to adopt Smart Specialisation as a

reference approach to localised innovation-led transformation agendas, as well as an increasing focus on SDGs as a key framework for setting targets and ambitions in regions. As the study in the Baltic Sea Region shows, applying Smart Specialisation makes it possible to mobilise resources all over the Europe for SDGs, industrial strategy and European Green Deal, which makes Smart Specialisation a powerful tool in Europe.

The strategy stories and analysis indicate that priority-setting includes alignment with SDGs. In that way, Smart Specialisation can act as the blueprint for mobilising the needed co-investment in the future of Europe. Smart Specialisations Strategies mobilise the entrepreneurial discovery processes for digital and green transformation.

5.4 Conclusions

Based on our dynamic study in represented regions in the all of Baltic Sea Region countries show focus on the smart specialization strategy creation and implementation with cross-regional collaboration and the implementation of Sustainable Development Goals Agenda 2030. The both innovation performance and innovation strategy approaches differ by regions.

A challenge for the Baltic Sea Region is that how regions attract relevant businesses inclusively, or even through cross-regional collaboration. One successful example is circular economy[53] policies and actions. Another challenge is how the Smart Specialisation contributes to grand societal challenges, solutions and wellbeing. In addition of circular economy and wellbeing, the other important topics are active healthy ageing, smart cities and climate change, which are cover by our study. Smart sustainable cities and regions with active engagement and collaboration of all stakeholders is the future ambition.

Smart Specialisation strategy and its implementation has had strong positive results in Baltic Sea regions and in the EU and beyond. Through Smart Specialisation strategy decision makers with stakeholders from academia and business may turn the regional and urban development vision and targets for the concrete SDG implementation actions and sustainable economic transformation.

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ECOSYSTEMS
CITIZENS
STAKEHOLDERS: BUSINESS
STAKEHOLDERS: ACADEMIA
SDG AGENDA 2030
SUSTAINABLE ECONOMIC TRANSFORMATION
CROSS-REGIONAL COLLABORA-TION
DECISION-MAKERS
SMART PORTS
SMART CITIES
BALTIC SEA REGION
Russia
Finland
Estonia
Latvia
Lithuania
Sweden
Denmark
Poland
Germany
SOCIETAL CHALLENGES
SMART SPECIALISATION STRATEGY
CIRCULAR ECONOMY
POLICIES & ACTIONS
ACTIVE ENGAGEMENT OF STAKEHOLDERS
CLIMATE CHANGE
WELL-BEING

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ANNEXES I - V

ANNEX I
List of Abbreviations

BSR – Baltic Sea Region
CCM – Cultural and Creative Cities Monitor
DESA – United Nations Department for Economic and Social Affairs
EIS – European Innovation Scoreboard
ERDF – European Regional Development Fund
ESF – European Structural Fund
EUSBSR – EU Strategy for the Baltic Sea Region
ITI – Integrated Territorial Investments
JRC – EU Joint Research Centre
LNG – Liquified Natural Gas
NUTS – Nomenclature of Territorial Units for Statistics
PSS – Pomorskie Smart Specialisation
RDI – Research, Development, and Innovation
R&D – Research and Development
RII – Regional innovation Index
RIS – Regional Innovation Scoreboard
RIS3 – Research and Innovation Strategy for Smart Specialisation
ROP PV – Regional Operational Programme for the Pomorskie Voivodeship
RSP – Regional Strategic Programme (s)
S3 – Smart Specialisation Strategy
STI – Science, Technology and Innovation
SDGs – United Nations Sustainable Development Goals
UNIDO – United Nations Industrial Development Organisation
UNESCO – United Nations Educational, Scientific, and Cultural Organisation
UNCTAD – United Nations Conference on Trade and Development

ANNEX II
Smart Up BSR Community

Smart-Up BSR is a Baltic Sea Region community of innovation actors which enables regional actors to engage with innovation partners and thus to facilitate research and prompt innovation potential in practice. For the Smart Up community this means regional smart specialisation strategy implementation is a practical orchestration. It is about fostering bottom-up regional innovation through peer-to-peer learning and entrepreneurial discovery process in a series of Innovation Camps and pilot experimentation in societally important areas.

Engagement for a Shared Vision

Smart-Up BSR addresses the challenge of making regional research & innovation strategies (RIS3) relevant and effective to a diverse set of stakeholders. It does so by pooling the dispersed knowledge and capabilities together, by engaging different stakeholders such as regional actors, universities, NGOs, politicians and businesses to create a shared vision of regional development and smart specialisation strategies in Baltic Sea regions. Collective vision and strategy development help to create and maintain stakeholder commitment and a sense of ownership.

The Way of Working

Smart-Up provides a continuity for interaction between stakeholders through a series of innovation camps organised over the span of three years. During Smart-Up innovation camps, participants work around challenges put forward by challenge owners in the Baltic Sea cities and regions. Innovated solutions are about promoting regional smart specialisation, and implementing pilots related to healthy ageing, climate change, circular economy and smart city. In the camps participants learn about local best practices and get inspiration from visiting local initiatives.

Smart-Up BSR: networking for innovation

This thee-year engagement process enables innovative approaches, systematic revision and selection of best regional practices in regional research & innovation strategies' implementation. It allows Smart-Up BSR partners to build up their networks and establish more solid inter-regional collaborations over the spearhead topics. Project outcomes focus on overcoming the stakeholder divide in the regions, and leveraging collective knowledge to achieve effective regional and transnational collaboration for realising Baltic Sea region policies in practice.

Activities

The project activities are organised in six Innovation Camps in different locations of the Baltic Sea region. During the duration of the Innovation Camps of 1-3 days the partners foster bottom-up and needs-driven innovation processes in selected regions, providing an opportunity for co-creation, experimenting and building trans-regional network for more effective smart specialisation strategies (RIS3) implementation. The Smart-Up innovation camps engage the participants in chosen 'innovation challenges' with regard to promoting regional smart specialisations. Pilots related challenges tackle four themes relevant across the regions: healthy ageing, climate change, circular economy, and smart cities. The participants also receive advice from experts from the European Committee of the Regions and Joint Research Centre. Two examples can be mentioned here. In Lithuania, experiences gained during the camps encouraged stakeholders of RIS3 to launch three hackathons. Whereas, the University of Latvia initiated the cooperation with the Riga City Council on the theme of smart city, resulting in the participation of university's representatives in the work group formed by the Latvian Ministry of Economics. To support future practical work in

strategy implementation and pilots deriving from it, the Smart Up project compiled a Pilot Planning Methodology. This is a compilation of diverse lessons learned through processes on pilots planning in all countries and regions participating in the project.

Participating Regions

The regions represented in the Smart Up BSR project include most of the Interreg Baltic Sea Region. The project's aim has been to help 10 regions in 9 countries to apply research and innovation strategies for smart specialisation (RIS3) or their national equivalent and to co-create concepts for their smart Specialisation and innovation strategies implementation. In doing so the project partners have focused on four thematic areas: active healthy ageing, digitalisation in smart city, climate change and circular economy.

The participating regions:

1. Denmark - Aarhus / Central-Denmark Region – Midtjylland
2. Estonia - Tallinn
3. Finland - Helsinki and Espoo / Helsinki -Uusimaa
4. Finland - Kotka / Kymenlaakso
5. Germany - Potsdam / Brandenburg / Berlin
6. Latvia - Riga and Liepaja
7. Lithuania - Klaipėda and Vilnius
8. Poland - Gdansk/Pomorskie
9. Russia - St-Petersburg
10. Sweden - Stockholm, as associated partner

ANNEX III
Smart Specialisation Priorities Regionally and Nationally

Region	Regional/Local Smart Specialisation strategy priorities	National Smart Specialisation strategic priorities
DENMARK Midtjylland, Central Denmark Region City of Aarhus "Action Driven Region"	Regional needs and potentials • Food • Energy and climate • Smart Industry • Creative Industries • ICT • Tourism • Healthcare and welfare technology Regional drivers for growth • Digitisation and automation • Food • Energy, Climate, and environmental tech • Tourism / Business Tourism Supporting: Healthcare Innovation, ICT, and Creative Industries	National cross-cutting priorities • Digitisation and new technology adoption • Qualified labour for local needs • Green and Circular transition • Clusters and Innovation partnerships • Entrepreneurship and Growth ambitions • Internationalisation and cross-border collaborations National drivers for growth • Digitisation and automation • Qualified labour and social inclusion • Green transition and circular economy • Internationalisation
ESTONIA City of Tallinn "Tallinn, driver of national Smart Specialisation"	City of Tallinn priorities • Service economy: • creative economy, tourism, transport and logistics, health services, financial services; • Future technologies: • health technologies, mechatronics, environmental technologies; • ICT - Information and communication technology horizontally.	National priorities • Information and communication technology horizontally through other sectors - use of ICT in industry (incl. automatization, robotics), cybersecurity, software development; • Health technologies and services - biotechnology, e-health (use of ICT for the development of medical services and products); • More effective use of resources - materials science and industry, innovative construction ("smart house"), health-supporting food, chemical industry (more effective use of oil share).
FINLAND Helsinki-Uusimaa Region "EU Innovation Leader"	Resource wisdom, forming an umbrella for: • Climate neutrality • Citizens' city • Industrial modernisation. Which are horizontally supported by: • Competence • Collaboration Revision additions to climate neutrality: • Circular economy • New energy • Bio-economy innovations • New materials	

FINLAND Kymenlaakso Region City of Kotka ”New impulses in Kotka Port”	• Logistics: safety and intelligent logistics • Bio economy: new products and business from resource-efficient and low-carbon bio and circular economy • Digitalization: cyber security and gamification and digital applications in logistics and bio economy as well as in tourism and health a wellbeing. Revision specified strengths and opportunities • Forest and bio economy-based products • Expertise in utilising digitalisation and tourism	
GERMANY Berlin/ Brandenburg Region City of Berlin and city of Potsdam “Brain region”	Spearhead clusters • Life sciences and healthcare • Energy technology • Mobility (incl. transport and logistics) • ICT, Media, Creative Industries • Photonics (incl. microsystems technology) Thematic priorities • Digitalisation • Real world labs and field testing • Work 4.0 and new professionals • Start-up founders	
LATVIA “Tensions of national and regional drivers”		National priorities • Knowledge-based bioeconomy • Smart Energy • Information and communication technologies • Biomedicine, medical technology, bio-pharmacy and biotechnology • Smart materials, technologies and engineering systems Social sciences and humanities as a horizontal impact area
LITHUANIA City of Kleipeda “Agency driven strategy”	City of Kleipeda thematic groups • Transport and logistics • Industry 4.0 • Energy City of Kleipeda priority axes • Marine economy • (port, logistics, industry, LNG cluster, maritime and health tourism) • Bio-economy • (chemistry, timber, bio-technology, education, blue technologies, renewable energy) • Economics of advanced industry • (4.0 competence centre) • Creative and service economy • (service centres, creative industry cluster, conferencing)	National priorities with own subthemes • Energy and sustainable environment • Health technologies and biotechnology • Agro-Innovation and food technologies • Novel production processes, materials and technologies • Smart, green and integrated transport • ICT - information and communication technologies • Inclusive and creative society

POLAND Pomorskie-Sopot Region City of Gdansk “Poland’s shining star”	Pomorksie-Sopot priorities • Off-shore, port and logistics technologies • Interactive technologies in an information-saturated environment • Eco-effective technologies in the generation, transmission, distribution and consumption of energy and fuels and in construction • Medical technologies in the area of civilization and ageing-associated diseases	
RUSSIA St. Petersburg Region City of St. Petersburg “From history to the future”	Priorities under the broad objective of ensuring a sustainable improvement of citizens’ quality of life: • Innovative City • Comfortable City • Open City Implemented in four directions: • Development of human capital • Increasing the quality of urban environment • Achieving sustained economic growth • Administrative efficiency and development of civil society Strategy of economic and social development includes 17 state programs for St. Petersburg	
SWEDEN Stockholm Region City of Stockholm “Hot spot for youth, capital, and innovation”	City of Stockholm 2040 vision: Open, Connected, Innovative • Socially sustainable • Financially sustainable • Ecologically sustainable • Democratically sustainable Strategic Direction for Sustainable growth and competitiveness in the Stockholm County 2025+ prioritizes • Innovation and entrepreneurship • Attractive and sustainable living environment • Competence development International collaboration and trade	

ANNEX IV
Regional Generic Profiles

1. Central Denmark Regional Profile

MIDTJYLLAND, DK	ITEMS	FIGURES	YEAR	SOURCE
Regional profile	GDP (MIO) (PPS)	€47,481.02	2018	Eurostat
	Projection 2025	€56,351.06	2019	JRC LUISA
	Projection 2030	€65,477.69	2019	JRC LUISA
	GDP per Capita (PPS)	€ 34 400	2017	Eurostat
	Employment	642200	2018	Eurostat
	Inhabitants	1313596	2018	Eurostat
	Projection 2025	1387270	2019	JRC LUISA
	Projection 2030	1430043	2019	JRC LUISA
	Density	103.2/km2	2018	Eurostat
	EU-28	118.0/km2	2018	Eurostat
SDG VLR (voluntary local review)	Link	https://urban.jrc.ec.europa.eu/#/en	2019	Urban Data Platform Plus Dashboard
Regional innovation	Index 2019 (EU28=100)	127,3	2019	Regional Innovation Scoreboard (RIS)
Reg.Innovation Index	RII	Leader Innovator	2019	Regional Innovation Scoreboard (RIS)
	Compared against BSR average(=89,0*)	143,0 %	2019	Regional Innovation Scoreboard (RIS) as reference
	RIS link	https://interactivetool.eu/RIS/RIS_2.html#		
RIM Plus/ Conditions for Innovation **	GERD (EU28=2,08%)	2.46%	2017, projection	Eurostat
	Regional Patent applications	680	2019	EPO, status 27.1.2020
	Tertiary education, 30-34, (EU28=40,7%)	44.4%	2018	Eurostat
	Link	https://ec.europa.eu/growth/tools-databases/regional-innovation-monitor/base-profile/central-denmark-region		

Smart Specialization	Strategy	Five themes are used for carrying out the smart specialisation of the Midtjylland region. Each theme forms an umbrella, under which actors and stakeholders, skills and projects are gathered. The themes are: Smart Industry, Creative ICT & Tourism, Growth drivers, Energy & Climate, Foodstuffs.		JRC S3 platform Information extracted 3/2020
	Link	https://s3platform.jrc.ec.europa.eu/documents/20182/232200/DK_Midtjylland_Growth_%26_Develop_Strategy_Final.pdf/41e46dea-3ed0-4267-a147-57227bb62d3b	2011	JRC S3 platform
		Midtjylland has formed an "important steps"-document		JRC S3 platform
	Link (update)	https://s3platform.jrc.ec.europa.eu/documents/20182/232200/DK_Midtjylland_Important+steps_implementing+growth+plan+%282016-2025%29.pdf/63d14d24-a528-4dcd-8c72-292d3dbd8658		JRC S3 platform
	S3 Platform link	https://s3platform.jrc.ec.europa.eu/regions/DK04/tags/DK04		
Cultural and Creative Cities Monitor***				
	C3 Index 2019	Aarhus: 18th / 39 cities on cat. L (250 000-500 000 inhabitants)	2019	Cultural & Creative Cities Monitor
	Aarhus link	https://composite-indicators.jrc.ec.europa.eu/cultural-creative-cities-monitor/cities/aarhus		
	Denmark link	https://composite-indicators.jrc.ec.europa.eu/cultural-creative-cities-monitor/countries/dk		
Country information				
Research & Innovation	RIO	https://rio.jrc.ec.europa.eu/en/country-analysis/Denmark		Research and Innovation Observatory***
Innovation	EIS index	https://interactivetool.eu/EIS/EIS_2.html#		European Innovation Scoreboard

*Calculated from the combined RIS values of the Baltic Sea states, which were compared against 2011 results

** Refers to Eurostat

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2. Estonia General Profile

TALLINN, EE	ITEMS	FIGURES	YEAR	SOURCE
Regional profile	GDP (MIO) (PPS)	€ 16,896.38	2018	Eurostat
	Projection 2025	€ 27,306.34	2019	JRC LUISA
	Projection 2030	€ 32,275.88	2019	JRC LUISA
	GDP per Capita (PPS)	33 800 €	2016	Eurostat
	Employment	334200	2018	Eurostat
	Inhabitants	590981	2018	Eurostat
	Projection 2025	575084	2019	JRC LUISA
	Projection 2030	573526	2019	JRC LUISA
	Density	30.4/km2	2018	Eurostat
	EU-28	118.0/km2	2018	Eurostat
SDG VLR (voluntary local review)	Link	https://urban.jrc.ec.europa.eu/#/en	2019	Urban Data Platform Plus Dashboard
Regional innovation	Index 2019 (EU28=100)	103,8	2019	European Innovation Scoreboard (EIS)
Reg. Innovation Index	RII	Strong Innovator	2019	European Innovation Scoreboard (EIS)
	Compared against BSR average(=89,0*)	116,5 %	2019	Regional Innovation Scoreboard (RIS) as reference
	EIS link	https://interactivetool.eu/EIS/EIS_2.html#		
RIM Plus/ Conditions for Innovation **	GERD (EU28=2,08%)	1.28%	2017	Eurostat
	National Patent applications	49	2019	EPO, status 27.1.2020
	Tertiary education, 30-34 (EU28=40,7%)	47.2%	2018	Eurostat
	Link	-		
Smart Specialization	Strategy	Seven themes are used for carrying out the smart specialisation in Estonia. Each theme forms an umbrella, under which actors and stakeholders, skills and projects are gathered. The themes are: e-Health, Biotechnology, ICT: Industry 4.0, ICT: Cyber Security, Robotics and Embedded Systems, ICT: e-Government and Data Science, Materials Technologies, Enhancement of Resources		JRC S3 platform Information extracted 3/2020
	Link	https://s3platform.jrc.ec.europa.eu/documents/20182/226990/estonian_rdi_strategy_2014-2020_en.pdf/759920a4-489d-4936-9bce-f08e782825f3	2014	JRC S3 platform
	S3 Platform link	https://s3platform.jrc.ec.europa.eu/regions/ee		

Cultural and Creative Cities Monitor***	C3 Index 2019	Tallinn: 5th / 39 cities on cat. L (250 000-500 000 inhabitants)	2019	Cultural & Creative Cities Monitor
	C3 Index 2019	Tartu: 2nd / 22 cities on cat. S (50 000-100 000 inhabitants)	2019	Cultural & Creative Cities Monitor
	Tallinn link	https://composite-indicators.jrc.ec.europa.eu/cultural-creative-cities-monitor/cities/tallinn		
	Tartu link	https://composite-indicators.jrc.ec.europa.eu/cultural-creative-cities-monitor/cities/tartu		
	Estonian link	https://composite-indicators.jrc.ec.europa.eu/cultural-creative-cities-monitor/countries/ee		
Country information		https://rio.jrc.ec.europa.eu/en/country-analysis/Estonia		Research and Innovation Observatory***
Research & Innovation	RIO			
Innovation	EIS index	https://interactivetool.eu/EIS/EIS_2.html#		European Innovation Scoreboard

*Calculated from the combined RIS values of the Baltic Sea states, which were compared against 2011 results

** Refers to Eurostat

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3. Helsinki-Uusimaa Regional Profile

HELSINKI-UUSIMAA	ITEMS	FIGURES	YEAR	SOURCE
Regional profile	GDP (MIO) (PPS)	€ 73,749.65	2018	Eurostat
	Projection 2025	€ 79,170.05	2019	JRC LUISA
	Projection 2030	€ 86.222.73	2019	JRC LUISA
	GDP per Capita (PPS)	41 800 €	2016	Eurostat
	Employment	817 900	2018	Eurostat
	Inhabitants	1 655 624	2018	Eurostat
	Projection 2025	1 617 420	2019	JRC LUISA
	Projection 2030	1 624 824	2019	JRC LUISA
	Density	182.8/km2	2018	Eurostat
	EU-28	118.0/km2	2018	Eurostat
SDG VLR (voluntary local review)	Link	https://urban.jrc.ec.europa.eu/#/en	2019	Urban Data Platform Plus Dashboard
Regional innovation	Index 2019 (EU28=100)	156,0	2019	Regional Innovation Scoreboard (RIS)
Reg. Innovation Index	RII	Leader Innovator	2019	Regional Innovation Scoreboard (RIS)
	Compared against BSR average(=89,0*)	175,2 %	2019	Regional Innovation Scoreboard (RIS) as reference
	RIS link	https://interactivetool.eu/RIS/RIS_2.html#		
RIM Plus/ Conditions for Innovation **	GERD (EU28=2,04%)	3.48% of GDP	2017	Eurostat
	Regional Patent applications	1219	2019	EPO, status 27.1.2020
	Tertiary education, 30-34 (EU28=40,7%)	51.9%	2019	Regional Innovation Monitor Plus Scores
	Link	https://ec.europa.eu/growth/tools-databases/regional-innovation-monitor/base-profile/helsinki-uusimaa-region		
Smart Specialization	Strategy	Four themes are used for carrying out the smart specialisation of the Helsinki-Uusimaa Region. Each theme forms an umbrella, under which actors and stakeholders, skills and projects are gathered. The themes are: Urban Cleantech; Digitalising Industry; Health and wellness; Citizen City		JRC S3 platform Information extracted 3/2020
	Link	https://s3platform.jrc.ec.europa.eu/documents/20182/231925/FI_Helsinki_Uusimaa_RIS3_Final.pdf/e0e7faf0-5600-4a07-804e-c7499a031d60	2015	JRC S3 platform
	Strategy Update	Strategy was updated for years 2018-2020.		JRC S3 platform
	Link (update)	https://helsinkismart.fi/helsinki-regions-smart-strategy-is-updated-for-2018-2020/	2017	JRC S3 platform
	S3 Platform link	https://s3platform.jrc.ec.europa.eu/regions/FI1B1/tags/FI1B1		

Cultural and Creative Cities Monitor***	C3 Index 2019	Helsinki: 10th /39 cities on XL (500 000-1 mil. inhabitants)	2019	Cultural & Creative Cities Monitor
	C3 Index 2019	Espoo: 20th /39 cities on L (250 000-500 000 inhabitants)	2019	Cultural & Creative Cities Monitor
	Helsinki link	https://composite-indicators.jrc.ec.europa.eu/cultural-creative-cities-monitor/cities/helsinki		
	Espoo link	https://composite-indicators.jrc.ec.europa.eu/cultural-creative-cities-monitor/cities/espoo		
	Finland link	https://publications.jrc.ec.europa.eu/repository/bitstream/JRC117336/fi.pdf		
Country information				
Research & Innovation	RIO	https://rio.jrc.ec.europa.eu/en/country-analysis/Finland		Research and Innovation Observatory***
Innovation	EIS index	https://interactivetool.eu/EIS/EIS_2.html#		European Innovation Scoreboard

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** Refers to Eurostat

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4. Kymenlaakso Regional Profile

KYMENLAAKSO, FI	ITEMS	FIGURES	YEAR	SOURCE
Regional profile	GDP (MIO) (PPS)	€5,266.00	2018	Eurostat
	Projection 2025	€6,150.92	2019	JRC LUISA
	Projection 2030	€6,804.77	2019	JRC LUISA
	GDP per Capita (PPS)	27 900 €	2016	Eurostat
	Employment	73 580	2018	Eurostat
	Inhabitants	175511	2018	Eurostat
	Projection 2025	187598	2019	JRC LUISA
	Projection 2030	190310	2019	JRC LUISA
	Density	33.9/km2	2018	Eurostat
	EU-28	118.0/km2	2018	Eurostat
SDG VLR (voluntary local review)	Link	https://urban.jrc.ec.europa.eu/#/en	2019	Urban Data Platform Plus Dashboard
Regional innovation*	Index 2019 (EU28=100)	120,8 %	2019	Regional Innovation Scoreboard (RIS)
Reg.Innovation Index	RII	Leader Innovator	2019	Regional Innovation Scoreboard (RIS)
	Compared against BSR average(=89,0*)	135,7 %	2019	Regional Innovation Scoreboard (RIS) as reference
	RIS link	https://interactivetool.eu/RIS/RIS_2.html#		
RIM Plus/ Conditions for Innovation **	GERD (EU28=2,04%)	1.73% of GDP	2017	Eurostat
	Regional Patent applications	121	2019	EPO, status 27.1.2020
	Tertiary education, 30-34 (EU28=40,7%)	35.3%	2019	Regional Innovation Monitor Plus Scores
	Link	https://ec.europa.eu/growth/tools-databases/regional-innovation-monitor/base-profile/south-finland		
Smart Specialization	Strategy	Four themes are used for carrying out the smart specialisation of the Kymenlaakso Region. Each theme forms an umbrella, under which actors and stakeholders, skills and projects are gathered. The themes are: Invest in activities with a view to Russia, Clean energy and ecological building, Smart, environmentally friendly packaging		JRC S3 platform Information extracted 3/2020
	Link	https://www.kymenlaakso.fi/attachments/article/13452/Kymenlaakso%27s%20smart%20specialisation%20RIS3%20strategy%202016-2020.pdf	2014, draft	JRC S3 platform
	S3 Platform link	https://s3platform.jrc.ec.europa.eu/regions/FI1C4/tags/FI1C4		
Cultural and Creative Cities Monitor***	C3 Index 2019	No cities of this region are measured in C3 Index 2019.	2019	Cultural & Creative Cities Monitor
	Finland link	https://composite-indicators.jrc.ec.europa.eu/cultural-creative-cities-monitor/countries/fi		

Country information			
Research & Innovation	RIO	https://rio.jrc.ec.europa.eu/en/country-analysis/Finland	Research and Innovation Observatory***
Innovation	EIS index	https://interactivetool.eu/EIS/EIS_2.html#	European Innovation Scoreboard

* Calculated from the combined RIS values of the Baltic Sea states, which were compared against 2011 results

** Refers to Eurostat

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5. Berlin / Brandenburg Region Profile

BRANDENBURG, DE	ITEMS	FIGURES	YEAR	SOURCE
Regional profile	GDP (MIO) (PPS)	€68,216.66(e)	2018	Eurostat
	Projection 2025	€88,412.15	2019	JRC LUISA
	Projection 2030	€100,897.47	2019	JRC LUISA
	GDP per Capita (PPS)	26 000 €	2016	Eurostat
	Employment	1 217 900	2018	Eurostat
	Inhabitants	2504040	2018	Eurostat
	Projection 2025	2607177	2019	JRC LUISA
	Projection 2030	2640702	2019	JRC LUISA
	Density	86,4 /km2	2018	Eurostat
	EU-28	118.0/km2	2018	Eurostat
SDG VLR (voluntary local review)	Link	https://urban.jrc.ec.europa.eu/#/en	2019	Urban Data Platform Plus Dashboard
Regional innovation	Index 2019 (EU28=100)	96,7	2019	Regional Innovation Scoreboard (RIS)
Reg.Innovation Index	RII	Strong Innovator	2019	Regional Innovation Scoreboard (RIS)
	Compared against BSR average(=89,0*)	108,6 %	2019	Regional Innovation Scoreboard (RIS) as reference
	RIS link	https://interactivetool.eu/RIS/RIS_2.html#		
RIM Plus/ Conditions for Innovation **	GERD (EU28=2,08%)	1.69%	2018	Eurostat
	Regional Patent applications	168	2019	EPO, status 27.1.2020
	Tertiary education, 30-34, (EU28=40,7%)	23,5 %	2018	Eurostat
	Link	https://ec.europa.eu/growth/tools-databases/regional-innovation-monitor/base-profile/brandenburg		

Smart Specialization	Strategy	13 themes are used for carrying out the smart specialisation of the Brandenburg region. Each theme forms an umbrella, under which actors and stakeholders, skills and projects are gathered. The themes are: Food and nutrition industry, Materials, Media and creative industry, Power engineering, Transport, mobility and logistics, ICT, Production and automation technology, Clean technologies, Healthcare, Tourism, Metal, Synthetic materials and chemistry, Optics and Photonics.		JRC S3 platform Information extracted 3/2020
	Link	https://s3platform.jrc.ec.europa.eu/documents/20182/229963/DE_Berlin_Brandenburg_RIS3_201106_Final.pdf/5eb3a0e7-b14b-412e-a9f9-6ac4e2e775a2	2011	JRC S3 platform
	Strategy Update			JRC S3 platform
	Link (update)			JRC S3 platform
	S3 Platform link	https://s3platform.jrc.ec.europa.eu/regions/DE4/tags/DE4		
Cultural and Creative Cities Monitor***	C3 Index 2019 C3 Index 2019	Berlin: https://composite-indicators.jrc.ec.europa.eu/cultural-creative-cities-monitor/cities/berlin No cities from Brandenburg State are measured in the C3 Index 2019.	2019	Cultural & Creative Cities Monitor
	Germany link	https://composite-indicators.jrc.ec.europa.eu/cultural-creative-cities-monitor/countries/de		
Country information				
Research & Innovation	RIO	https://rio.jrc.ec.europa.eu/country-analysis/Germany		Research and Innovation Observatory***
Innovation	EIS index	https://interactivetool.eu/EIS/EIS_2.html#		European Innovation Scoreboard

* Calculated from the combined RIS values of the Baltic Sea states, which were compared against 2011 results

** Refers to Eurostat

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6. Latvia General Profile

LATVIA	ITEMS	FIGURES	YEAR	SOURCE
Regional profile	GDP (MIO) (PPS)	€41,086.20	2018	Eurostat
	Projection 2025	€57,856.91	2019	JRC LUISA
	Projection 2030	€71,728.29	2019	JRC LUISA
	GDP per Capita (PPS)	20 000 €	2016	Eurostat
	Employment	885 990	2018	Eurostat
	Inhabitants	1934379	2018	Eurostat
	Projection 2025	1822706	2019	JRC LUISA
	Projection 2030	1735181	2019	JRC LUISA
	Density	30.4/km2	2018	Eurostat
	EU-28	118.0/km2	2018	Eurostat
SDG VLR (voluntary local review)	Link	https://urban.jrc.ec.europa.eu/#/en	2019	Urban Data Platform Plus Dashboard
Regional innovation	Index 2019 (EU28=100)	65,7	2019	Regional Innovation Scoreboard (RIS)
Reg. Innovation Index	RII	Moderate Innovator	2019	Regional Innovation Scoreboard (RIS)
	Compared against BSR average(=89,0*)	73,7 %	2019	Regional Innovation Scoreboard (RIS) as reference
	RIS link	https://interactivetool.eu/RIS/RIS_2.html#		
RIM Plus/ Conditions for Innovation **	GERD (EU28=2,08%)	0.64%	2018	Eurostat
	National Patent applications	22	2019	EPO, status 27.1.2020
	Tertiary education, 30-34 (EU28=40,7%)	42.7%	2018	Eurostat
	Link	-		
Smart Specialization	Strategy	Five themes are used for carrying out smart specialisation in Latvia. Each theme forms an umbrella, under which actors and stakeholders, skills and projects are gathered. The themes are: Knowledge intensive bio-economy, Biomedicine, medical technologies and biotechnology, Smart materials, technology and engineering, Advanced ICT, and Smart Energy		JRC S3 platform Information extracted 3/2020
	Link	https://s3platform.jrc.ec.europa.eu/documents/20182/227021/Guidelines+for+Science+Technology+and+Innovation+2014-2020.pdf/d96566cd-e61b-471b-9f80-4d06236037b4	2013	JRC S3 platform
	Strategy Update	Latvia formed a progress report in 2018.		JRC S3 platform
	Link (update)	https://s3platform.jrc.ec.europa.eu/documents/20182/0/RIS3_progress+report_LV_2018.pdf/940176c6-b886-4213-9f18-75c20251bfb9	2018	JRC S3 platform
	S3 Platform link	https://s3platform.jrc.ec.europa.eu/regions/LV/tags/LV		

Cultural and Creative Cities Monitor***	C3 Index 2019	Riga: 26th / 39 cities on cat. L (250 000-500 000 inhabitants)	2019	Cultural & Creative Cities Monitor
	C3 Index 2019	Liepaja: 18th / 22 cities on cat. S (50 000-100 000 inhabitants)	2019	Cultural & Creative Cities Monitor
	Riga link	https://composite-indicators.jrc.ec.europa.eu/cultural-creative-cities-monitor/cities/riga		
	Liepaja link	https://composite-indicators.jrc.ec.europa.eu/cultural-creative-cities-monitor/cities/liepaja		
	Latvian link	https://composite-indicators.jrc.ec.europa.eu/cultural-creative-cities-monitor/countries/lv		
Country information				
Research & Innovation	RIO	https://rio.jrc.ec.europa.eu/en/country-analysis/Latvia		Research and Innovation Observatory***
Innovation	EIS index	https://interactivetool.eu/EIS/EIS_2.html#		European Innovation Scoreboard

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7. Lithuania General Profile

LITHUANIA	ITEMS	FIGURES	YEAR	SOURCE
Regional profile	GDP (MIO) (PPS)	€66,411.86	2018	Eurostat
	Projection 2025	€85,541.72	2019	JRC LUISA
	Projection 2030	€93,460.96	2019	JRC LUISA
	GDP per Capita (PPS)	23 500 €	2016	Eurostat
	Employment	1 354 100	2018	Eurostat
	Inhabitants	2808901	2018	Eurostat
	Projection 2025	2563857	2019	JRC LUISA
	Projection 2030	2394148	2019	JRC LUISA
	Density	44,7 /km2	2018	Eurostat
	EU-28	118.0/km2	2018	Eurostat
SDG VLR (voluntary local review)	Link	https://urban.jrc.ec.europa.eu/#/en	2019	Urban Data Platform Plus Dashboard
Regional innovation	Index 2019 (EU28=100)	81,1	2019	Regional Innovation Scoreboard (RIS)
Reg. Innovation Index	RII	Moderate Innovator	2019	Regional Innovation Scoreboard (RIS)
	Compared against BSR average(=89,0*)	91,0 %	2019	Regional Innovation Scoreboard (RIS) as reference
	RIS link	https://interactivetool.eu/RIS/RIS_2.html#		
RIM Plus/ Conditions for Innovation **	GERD (EU28=2,08%)	0.94%	2018	Eurostat
	National Patent applications	29	2019	EPO, status 27.1.2020
	Tertiary education, 30-34, (EU28=40,7%)	57.6%	2018	Eurostat
	Link	-		
Smart Specialization	Strategy	Six themes are used for carrying out smart specialisation in Lithuania. Each theme forms an umbrella, under which actors and stakeholders, skills and projects are gathered. The themes are: Agricultural innovations and Food technologies, Energy and Sustainable environment, New production processes, materials and technologies, Health technologies and biotechnologies, Transport, logistics and ICT, Inclusive and creative society		JRC S3 platform Information extracted 3/2020
	Link	https://s3platform.jrc.ec.europa.eu/documents/20182/223684/LT_RIS3_201404_Final.pdf/0e516a08-b6d8-4806-af39-dac515eb9c38	2014	JRC S3 platform
	Strategy Update	Lithuania formed a progress report in 2017.		JRC S3 platform
	Link (update)	https://s3platform.jrc.ec.europa.eu/documents/20182/226901/LT_First_Progess_Report_2017.pdf/38ca2bdf-2fda-4f3b-b791-b055ab10b27d	2017	JRC S3 platform
	S3 Platform link	https://s3platform.jrc.ec.europa.eu/regions/LT/tags/LT		

Cultural and Creative Cities Monitor***	C3 Index 2019	Vilnius: 14th / 39 cities on cat. XL (500 000-1 mil. inhabitants)	2019	Cultural & Creative Cities Monitor
	C3 Index 2019	Klaipeda: 29th / 56 cities on cat. M (100 000-250 000 inhabitants)	2019	Cultural & Creative Cities Monitor
	C3 Index 2019	Kaunas: 23th / 39 cities on cat. L (250 000- 500 000 inhabitants)	2019	Cultural & Creative Cities Monitor
	Vilnius link	https://composite-indicators.jrc.ec.europa.eu/cultural-creative-cities-monitor/cities/vilnius		
	Klaipeda link	https://composite-indicators.jrc.ec.europa.eu/cultural-creative-cities-monitor/cities/klaipeda		
	Kaunas link	https://composite-indicators.jrc.ec.europa.eu/cultural-creative-cities-monitor/cities/kaunas		
	Lithuanian link	https://composite-indicators.jrc.ec.europa.eu/cultural-creative-cities-monitor/countries/lt		
Country information				
Research & Innovation	RIO	https://rio.jrc.ec.europa.eu/country-analysis/Lithuania		Research and Innovation Observatory***
Innovation	EIS index	https://interactivetool.eu/EIS/EIS_2.html#		European Innovation Scoreboard

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8. Gdansk / Pomorskie Regional Profile

POMORSKIE, PL	ITEMS	FIGURES	YEAR	SOURCE
Regional profile	GDP (MIO) (PPS)	€46,491.37	2018	Eurostat
	Projection 2025	€63,241.67	2019	JRC LUISA
	Projection 2030	€73,561.96	2019	JRC LUISA
	GDP per Capita (PPS)	20 200 €	2016	Eurostat
	Employment	984 900	2018	Eurostat
	Inhabitants	2294926	2018	Eurostat
	Projection 2025	2260018	2019	JRC LUISA
	Projection 2030	2233720	2019	JRC LUISA
	Density	130.0 /km2	2018	Eurostat
	EU-28	118.0/km2	2018	Eurostat
SDG VLR (voluntary local review)	Link	https://urban.jrc.ec.europa.eu/#/en	2019	Urban Data Platform Plus Dashboard
Regional innovation	Index 2019 (EU28=100)	57,7	2019	Regional Innovation Scoreboard (RIS)
Reg. Innovation Index	RII	Moderate Innovator	2019	Regional Innovation Scoreboard (RIS)
	Compared against BSR average (=89,0*)	64,7 %	2019	Regional Innovation Scoreboard (RIS) as reference
	RIS link	https://interactivetool.eu/RIS/RIS_2.html#		
RIM Plus/ Conditions for Innovation **	GERD (EU28=2,08%)	1.08%	2018	Eurostat
	Regional Patent applications	32	2019	EPO, status 27.1.2020
	Tertiary education, 30-34, (EU28=40,7%)	45.1%	2018	Eurostat
	Link	https://ec.europa.eu/growth/tools-databases/regional-innovation-monitor/base-profile/pomorskie		
Smart Specialization	Strategy	Four themes are used for carrying out the smart specialisation of the Pomorskie region. Each theme forms an umbrella, under which actors and stakeholders, skills and projects are gathered. The themes are: Off-shore, port and logistics technologies, Interactive technologies in an information-saturated environment, Eco-effective technologies in generation, transmission, distribution and consumption of energy and fuels, and in construction, Medical technologies in the area of civilization and ageing-associated diseases.		JRC S3 platform Information extracted 3/2020
	Link	https://s3platform.jrc.ec.europa.eu/documents/20182/231100/PL_Pomorskie_RIS3_Final.pdf/ea4e8b4e-32b4-433a-ae39-b099d81c5d6e		JRC S3 platform
	S3 Platform link	https://s3platform.jrc.ec.europa.eu/regions/PL63/tags/PL63		

Cultural and Creative Cities Monitor***	C3 Index 2019	Gdansk: 21st / 39 cities on cat. L (250 000-500 000 inhabitants)	2019	Cultural & Creative Cities Monitor
	Gdansk link	https://composite-indicators.jrc.ec.europa.eu/cultural-creative-cities-monitor/cities/gdansk		
	Poland link	https://composite-indicators.jrc.ec.europa.eu/cultural-creative-cities-monitor/countries/pl		
Country information				
Research & Innovation	RIO	https://rio.jrc.ec.europa.eu/country-analysis/Poland		Research and Innovation Observatory***
Innovation	EIS index	https://interactivetool.eu/EIS/EIS_2.html#		European Innovation Scoreboard

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9. St. Petersburg Regional Profile

ST PETERSBURG, RU	ITEMS	FIGURES	YEAR	SOURCE
Regional profile	GDP	4 193 489 500 000 RUB	2018	GKS (Rosstat) (extracted 14.07.2020)
	GDP in EUR	53 930 668 032€		Converted 14.07.2020
	GDP per Capita	781 214,3 RUB	2018	GKS (Rosstat) (extracted 14.07.2020)
	GDP per Capita in EUR	10 046,86 €		Converted 14.07.2020
	Employment	2 951 700	2019	GKS (Rosstat) (extracted 14.07.2020)
	Inhabitants	5 398 064	2020	GKS (Rosstat) (1/2020)
	Projection 2025	5 501 200		GKS (Rosstat) (extracted 14.07.2020)
	Projection 2030	5 545 400		GKS (Rosstat) (extracted 14.07.2020)
	Density	3751,2/km2	2020	Population/area
	EU-28	118.0/km2	2018	
SDG VLR (voluntary local review)	Link	https://www.gks.ru/sdg/reporting-status	2020	
Regional innovation*	GERD (EU28=2,04%, Russia=1%)	2,96 %	2018	GKS (Rosstat) (extracted 14.07.2020)
	Regional Patent applications	5,89 domestic patents / 10 000 persons	2019	GKS (Rosstat) (extracted 14.07.2020)

10. Stockholm Regional Profile

STOCKHOLM, SE	ITEMS	FIGURES	YEAR	SOURCE
Regional profile	GDP (MIO) (PPS)	€117,358.86	2018	Eurostat
	Projection 2025	€152,775.12	2019	JRC LUISA
	Projection 2030	€173,930.20	2019	JRC LUISA
	GDP per Capita (PPS)	50 000 €	2016	Eurostat
	Employment	1 219 200	2018	Eurostat
	Inhabitants	2308143	2018	Eurostat
	Projection 2025	2401026	2019	JRC LUISA
	Projection 2030	2476322	2019	JRC LUISA
	Density	356.6 /km2	2018	Eurostat
	EU-28	118.0/km2	2018	Eurostat
SDG VLR (voluntary local review)	Link	https://urban.jrc.ec.europa.eu/#/en	2019	Urban Data Platform Plus Dashboard
Regional innovation	Index 2019 (EU28=100)	153,8	2019	Regional Innovation Scoreboard (RIS)
Reg. Innovation Index	RII	Leader Innovator	2019	Regional Innovation Scoreboard (RIS)
	Compared against BSR average (=89,0*)	172,7 %	2019	Regional Innovation Scoreboard (RIS) as reference
	RIS link	https://interactivetool.eu/RIS/RIS_2.html#		
RIM Plus/ Conditions for Innovation **	GERD (EU28=2,04%)	3.75% of GDP	2017	Eurostat
	Regional Patent applications	2389	2019	EPO, status 27.1.2020
	Tertiary education, 30-34 (EU28=40,7%)	60.7%	2019 (break in time series)	Regional Innovation Monitor Plus Scores
	Link	https://ec.europa.eu/growth/tools-databases/regional-innovation-monitor/base-profile/stockholm		
Smart Specialization	Strategy	Six themes are used for carrying out the smart specialisation of the Stockholm region. Each theme forms an umbrella, under which actors and stakeholders, skills and projects are gathered. The themes are: Green transport and housing, Advanced production and materials, Smart sustainable region, ICT and Digitalisation, Healthcare and Life Sciences, Industrial modernization.		JRC S3 platform Information extracted 3/2020
	Link*	https://s3platform.jrc.ec.europa.eu/documents/20182/232763/SE_Stockholm_RIS3_2014_Final.pdf/7e013219-7ab9-406d-8f16-40addbeb2950	2014, draft	JRC S3 platform
	Strategy Update			JRC S3 platform
	Link (update)			JRC S3 platform
	S3 Platform link	https://s3platform.jrc.ec.europa.eu/regions/SE110/tags/SE110		

Cultural and Creative Cities Monitor***	C3 Index 2019	Stockholm: 3rd /39 cities on XL (500 000-1 mil. inhabitants)	2019	Cultural & Creative Cities Monitor
	Stockholm link	https://composite-indicators.jrc.ec.europa.eu/cultural-creative-cities-monitor/cities/stockholm		
	Sweden link	https://composite-indicators.jrc.ec.europa.eu/cultural-creative-cities-monitor/countries/se		
Country information				
Research & Innovation	RIO	https://rio.jrc.ec.europa.eu/country-analysis/Sweden		Research and Innovation Observatory***
Innovation	EIS index	https://interactivetool.eu/EIS/EIS_2.html#		European Innovation Scoreboard

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List of Figures

List of Tables

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Maroš Šefčovič
Vice President, European Commission
Interinstitutional Relations and Foresight

'Strategic foresight is about anticipating, exploring and acting. And the third part – acting – is what makes foresight strategic.'

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