SUMMARY

The Smart Specialization Strategy for the South-East Development Region

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List of acronyms

CAI	Comparative Advantage Index
CIF	Cost, Insurance, Freight
CN	Combined Nomenclature
CPI	Competitive Potential Index
DFI	Direct Foreign Investments
ERDF	European Regional Development Funds
ESIF	European Structural and Investment Funds
EU	European Union
FOB	Free on Board
GAV	Gross Added Value
GDP	Gross Domestic Product
GPT	General Purpose Technologies
GVC	Global Value Chain
ICT	Information and Communication Technology
MRDPAEF	Ministry of Regional Development, Public Administration and European Funds
NACE	Classification of Activities in the National Economy
NASRI	National Authority for Scientific Research and Innovation
NACSBP	Nomenclature for the analysis and comparison of scientific budgets and programs
NBR	National Bank of Romania
NIS	National Institute of Statistics
NP	National Programme
NPRTDI	National Plan for Research, Technological Development and Innovation

NRDP	National Rural Development Programme
NSC	National Strategy for Competitiveness
NSRDI	National Strategy for Research, Development and Innovation 2014-2020
OECD	Organization for Economic Cooperation and Development
PPP	Purchasing Power Parity
PPS	Purchasing Power Standard
RDA	Regional Development Agency
RDI	Research Development Innovation
RIC	Regional Innovation Consortium
RIS3	Regional Innovation Strategy
ROP	Regional Operational Programme
SBA	Small Business Act
SOIT	State Office for Inventions and Trademarks
SOP ICE	Sectoral Operational Programme Increase of Economic Competitiveness
SEO	Social Economy Organizations
SMEs	Small and Medium Enterprises
SSS SEDR	Smart Specialization Strategy of South-East Development Region
SWOT	Strenghts, Weaknesses, Threats and Opportunities

Table of contents

Introduction

The purpose of the strategy

Investments in research, innovation and entrepreneurship represent the core of Europe 2020 strategy and also a key response of Europe to the difficulties created by the economic crisis. According to the Guide to Research and Innovation Strategies for Smart Specialization (RIS3), the adoption of an integrated and strategic approach to innovation is a key factor that maximizes the potential for research and innovation at European, national and regional level.

The concept of regional smart specialization (RIS3) has the role to provide the necessary context for substantiating the investments made in the areas of research, development and innovation achieved through the EU cohesion policy. This concept was also promoted in the paper "Regional policy contributing to smart growth in Europe 2020". In this document, the European Commission encourages the development of national and regional research and innovation strategies for smart specialization as a means to provide sustained support from the Structural Funds. Intelligent specialization requires a strategic and integrated approach to harness the potential for smart growth and knowledge-based economy in all regions.

The RIS3 approach is relevant to all the three priorities of Europe 2020 Strategy, namely:

- smart growth through more efficient investments in education, research and innovation;
- sustainable growth through decisive focus on a low-carbon economy;
- inclusive growth, with an emphasis on job creation and on poverty reduction.

Smart specialization is based on a process of "entrepreneurial discovery" and identifying areas where a region excels or has the potential to excel in the future. This approach is also included in the Cohesion Policy 2014-2020, which is a conditionality for the use of European Regional Development Fund (ERDF) for competitive development in 2014-2020.

Smart specialization strategies are an appropriate way of solving and addressing social, environmental, climate and energy challenges such as demographic change, resource efficiency, energy security and resilience to climate change. A precondition of regional development strategies is to identify the unique features and strengths of each country and region, to highlight the competitive advantages of each region, and to involve stakeholders and regional resources around a vision focused on the criterion of excellence on their future.

RIS3 concentrates economic development efforts and investments on the relative

advantages of each region, exploiting economic opportunities and emerging trends, acting to stimulate economic growth. RIS3 increases the added value, impact and visibility of EU funding. It ensures efficiency in spending money in a period of budgetary constraints and (more) limited public resources. RIS3 provides synergies between policies and funding at European level, complementing national and regional schemes and private sector investment. Creating a smart specialization strategy is necessary and is the best way to improve benefits in terms of research, development and innovation.

In this context, the South-East Regional Development Agency, as a non-governmental public body, active in the field of regional development, has proposed the development of a Smart Specialization Strategy for the region. The main objective of this strategy is to contribute to substantiating the process of strategic planning for the development of South-East Region for the 2014-2020 programming period, by analyzing the current state of economic development of the region, focusing on the identification of the best performing sectors at regional level, with competitive advantages. Following the elaboration of the SSS SEDR, there will be identified the priority areas in which the investments will be concentrated in the next programming period 2014-2020, as well as the framework necessary for the development of an efficient economic and social environment at regional level.

The process of developing the strategy

The Smart Specialization Strategy of the South-East Development Region will be implemented through a partnership process that aims to involve sectors with a strong innovative character (enterprises, young entrepreneurs, clusters, business organizations / chambers of commerce, universities, public and private institutions/research bodies, science and technology parks, entities of technological transfer, local public authorities, incubators, county school inspectorates, NGOs, social organizations and other relevant institutions).

The elaboration of the Smart Specialization Strategy for South-East Development Region will focus on a limited number of competitive areas, identified following the socio-economic analysis carried out at regional level and following a qualitative and quantitative analysis among the representatives of business environment, business support structures, universities, research institutes, research centers and centers of technology transfer. The partnership process for setting out

innovation priorities at regional level will ensure the responsibility for the implementation of the Smart Specialization Strategy.

The Smart Specialization Strategy of the South-East Development Region 2014-2020 includes the following main directions:

- Analysing the regional context and innovation potential;
- Organizing a minimum number of six working meetings (Focus Groups) on the areas of smart specialization identified at regional level, with the relevant target group representatives on each field;
- Applying surveys (through questionnaires) among each category of target group representatives;
- Developing a global vision for the future of the region;
- Defining coherent policy combinations, directives and action plans;
- Integrating the mechanisms for monitoring and evaluating the Smart Specialization Strategy of the South-East Development Region.

The development of Smart Specialization Strategy for South-East Development Region 2014-2020 implies the use of an appropriate methodology, based on an optimal mix of methods and techniques: collection of data / information, quantitative analysis and qualitative analysis.

In order to develop the Smart Specialization Strategy of the South-East Development Region 2014-2020, it was taken into account the correlation with the main European, national and regional strategic documents relevant for the period 2014-2020:

- Guide to Research and Innovation – Strategies for Smart Specialization S3, endorsed at EU level;
- National Strategy for Research-Development-Innovation and the National Strategy for the Smart Specialization of Romania for the period 2014-2020;
- National Strategy for Competitiveness 2014-2020;
- Plan of measures to stimulate the establishment and development of SMEs through the implementation of the Small Business Act (SBA);
- Operational Programs of Romania under the 2014-2020 Partnership Agreement with the European Union: Regional Operational Programme, Competitiveness Operational Programme, Operational Programme Human Capital, Large Infrastructure Operational Programme, Operational Programme Administrative Capacity,

Operational Programme Technical Assistance, Operational Programme Disadvantaged Human Resources;

- National Plan for RDI 2014-2020;
- Multiannual plan for the timely collection and aggregation of data to assess the effectiveness and impact of programmes;
- South-East Regional Development Plan 2014-2020.

Chapter I. Analysis of the regional context and the innovation potential of the South-East Region

1.1 Regional assets - technological infrastructures

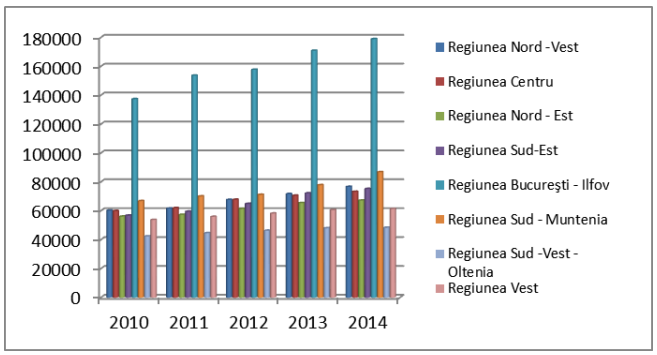
In order to identify the main smart specialization sectors of the South-East Development Region, several economic indicators were considered:

- a) Economic context of the South-East Region
- b) Labor force in the South-East Region
- c) Entrepreneurship in the South-East Region
- d) Investments in the South-East Region
- e) The comparative advantages of the South-East Region
- f) Analysis of the research and development sector at regional level
- g) Regional innovation and technology transfer activity
- h) Smart specialization potential

In the South-East Development Region, **the Gross Domestic Product (GDP)**, expressed in million RON, was 75,239.3 million RON in 2014, which represented 11.26% of Romania's GDP and about 0.12% of EU 28 GDP.

The South-East Region is ranked fourth in terms of regional GDP, the level recorded in 2014 being 2.3 times lower than the GDP of the Bucharest-Ilfov Region, the most developed of the eight regions of the country.

Gross Domestic Product at regional level (2010-2014), million RON

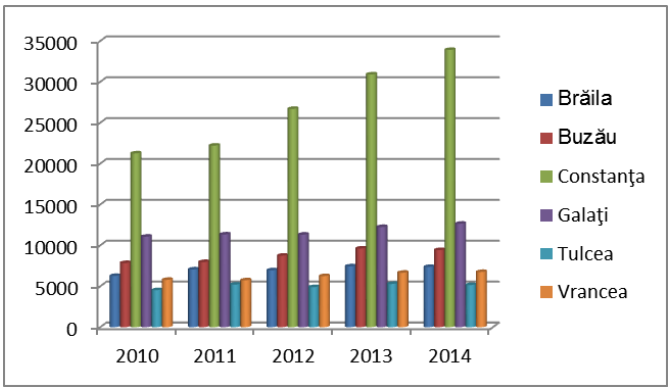


At county level, the highest value of Gross Domestic Product is registered in Constanta County, followed, at a significant distance, by the Galati and Braila. At the opposite end, Tulcea and Vrancea counties show the lowest GDP values, with a share of only 6.84% and

8.96% of the total GDP of the South-East Region in 2014.

Considering a timely perspective, it is noticed that during the period 2010-2014, Constanta county recorded the most significant increase in termsn gross domestic product (1.59 times increase), followed by Buzau (1.20 times increase) and Braila (1.17 times increase).

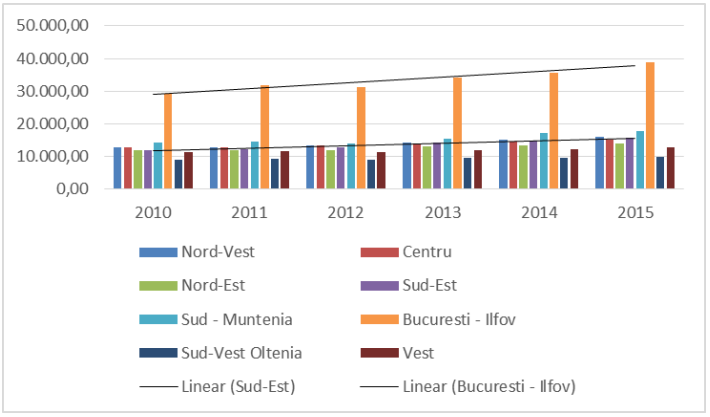
Gross Domestic Product at County level (2010-2014), million RON



The evolution of the **GVA (Gross Value Added)** is on an upward trend, from 12,054.98 million EUR in 2010 to 15,617.24 million EUR in 2015. Throughout the analyzed timeframe, the share of regional GVA in the national GVA was relatively constant, around 11%.

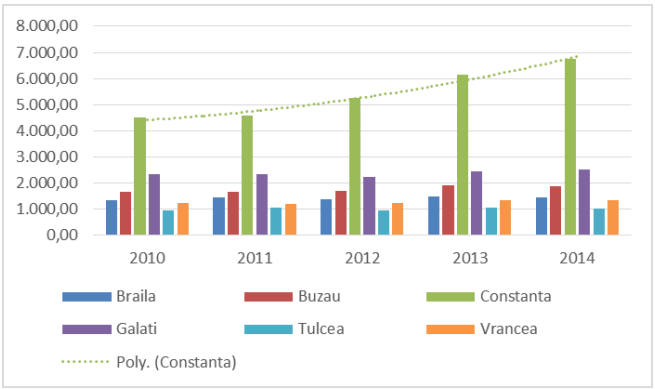
Within the South-East Region, Constanta county can be highlighted, surpassing by far the other counties, the trend of the indicator being positive, from 4,503.37 million EUR in 2010 to 6,751.18 million EUR in 2014.

GVA at regional level (2010-2014), million EURO



At the level of all 6 counties of the region, the sectors with the most significant contribution to the GVA formation are **industry, production and agriculture**. Constanta county presents the highest values in the region for all sectors of activity, while the lowest values are recorded in Vrancea and Tulcea counties.

GVA at county level (2010-2014), million EURO

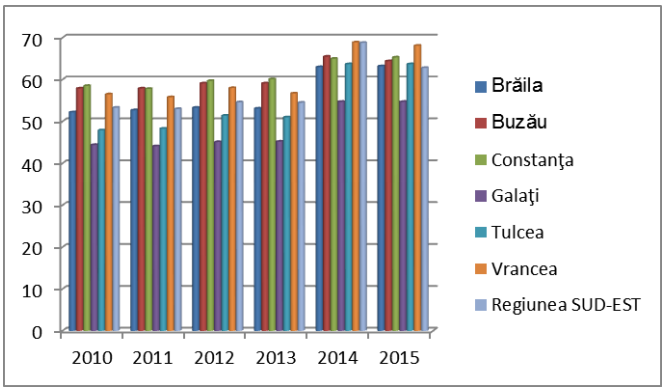


The South-East Development Region ranks sixth in 2015 considering its registered **employment rate** (62.8%), having higher values only compared to the North-East

(57.6%) and South Muntenia (59.6%) regions. Also, in the analyzed timeframe, the employment rate in the South-East Region showed the same positive trend registered at national level, having an increase of 9.5 percent in 2015 compared to 2010.

The county with the highest employement rate in 2015 is Vrancea county (68.1%), while the lowest employment rate in the region is recorded in Galati county (54.7%).

Employment rate by counties (2010-2015)

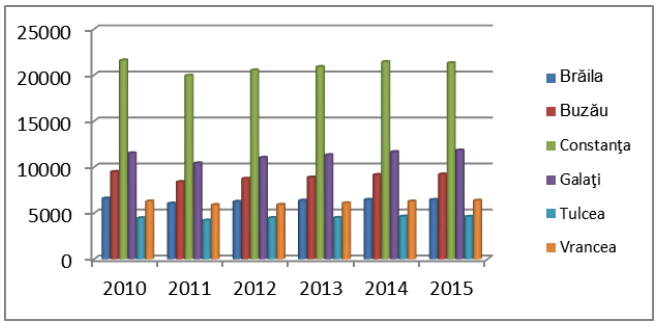


In terms of the number of **active local units**, the South-East Region ranks fourth at national level, with a total of 59,845 active local units.

In 2015, the number of local active units in the South-East Region reached the highest value in Constanta county (21,311), followed by Galati county, with 11,834 active local units.

The sectors of activity in which most of the active local units were registered in 2015 in the South-East Region are: **Wholesale and retail commerce; repair of motor vehicles and motorcycles** (22,529), **manufacturing** (5,509) and **transport and storage** (5,405).

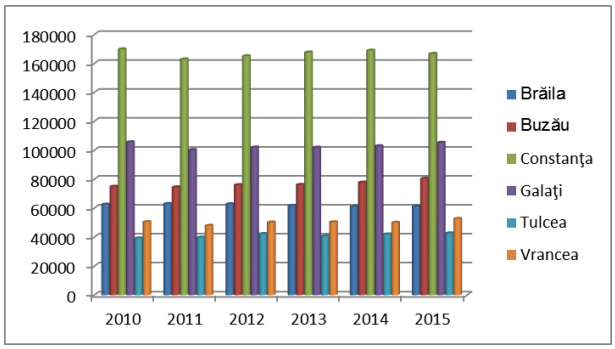
Number of active local units, by counties (2010-2015)



The county with the highest **average number of employees** in the period 2010-2015 is Constanta, followed by Galati, with a number of 105,375 at the end of 2015. The counties ranked last in terms of average number of employees in 2015, are Tulcea (42,815), Vrancea (52,774) and Braila (61,332).

The South-East Region occupies the first place at national level in 2015 considering the average number of employees in the sector of water distribution, sanitation, waste management, decontamination activities with a total number of 15,443 employees.

Average number of employees, by counties (2010-2015)

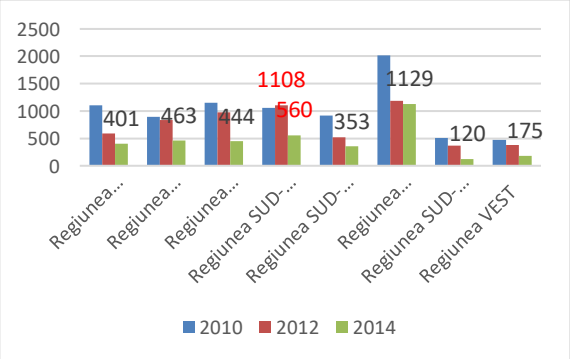


From the perspective of the **average number of employees**, by industrial activity NACE Rev.2, the following sectors / sub-sectors can be highlighted:

- Manufacturing industry of the following sub-sectors: Manufacture of clothing, Metallurgy, Manufacture of other transport equipment, Repair, maintenance and installation of machinery and equipment;
- Water distribution, sanitation, waste management, decontamination activities;
- Mining industry.

In the South-East Region, the **number of innovative enterprises** decreased from 1108 in 2012 to just 560 in 2014. According to Inobarometer 2011, the South-East Region had an innovation degree of 28.84%, being ranked at national level on the 5th place.

Innovative Enterprises by Development Region (2010-2014)



Clustering Potential - The clusters in the South-East Development Region are:

1. Cluster Traditions Manufacture Future TMV South East.
2. Romanian River Transport
3. Romanian Maritime Cluster
4. Cluster for Healthcare "Dunărea de Jos" (Low Danube)
5. The cluster association Regional Green Solutions Low Danube
6. IT&C Cluster "Dunărea de Jos" (Low Danube)
7. Advanced anti-counterfeiting technologies – INNOVATION CLUSTER
8. MEDGreen CLUSTER Association
9. INOMAR Cluster
10. Bio Danubius Cluster
11. "Danube Delta" Cluster (ODAS)
12. "Touristic Carpathian" Cluster

Smart specialization potential:

In Braila county, in 2015, there is a great potential for smart specialization in *wholesale and retail commerce; repair of motor vehicles and motorcycles, manufacturing, agriculture, forestry and fishing, transport and storage and construction.*

In Buzau County, the *manufacturing industry* had a global utility of 3.83 in 2015, being the economic sector with the largest number of employees in the county, followed by *wholesale and retail commerce; repair of motor vehicles and motorcycles*.

In Constanta County, the largest global utility is in *wholesale and retail commerce; repair of motor vehicles and motorcycles*. The following specialization activities are Manufacturing, Transport and Storage, Construction, Agriculture, Forestry and Fisheries.

In Galati county the following sectors prevail: *wholesale and retail commerce; repair of motor vehicles and motorcycles and manufacturing, as well as construction and transportation and storage*.

In Tulcea county, the largest global utility is attributed to *wholesale and retail commerce; repair of motor vehicles and motorcycles, manufacturing, agriculture, forestry and fishing, water distribution; sanitation, waste management, decontamination activities, generation and supply of electricity and heat, gas, hot water and air conditioning, information and communications*.

In Vrancea county, the sectors with smart specialization potential are also *wholesale and retail commerce; repair of motor vehicles and motorcycles, manufacturing, agriculture, forestry and fishing*.

Following the analysis of the research, development and innovation (RDI) infrastructure and in particular the clustering potential of the South-East Development Region, the following were identified as the main sectors for smart specialization: manufacturing of submarines, clothing manufcturing, manufacturing of transport means, electricity production and supply, Eco-technology, tourism, information and communication technology, health.

1.2 Links / relations with the world and positioning the region in the EU / global economy

Methodological approach

This chapter analyzed the position of the South-East Region compared to other European Union territories by highlighting structural features, competitive advantages and performance in terms of research, development and innovation policies and strategies.

In addition to the fact that this strategy is closely linked to research, development and innovation policies, a fair comparative analysis exercise includes a multi-dimensional approach along with the presentation of issues related to RDI performance of the territories and of the structural, geographical and socio-economic ones, the latter representing factual elements that could affect or stimulate the RDI performance of a territory.

This multi-dimensional approach has been used in the process of selecting the regions / territories with which the South-East Region has been compared in order to ensure a relevant comparison of the South-East Region with territories that have similar performances or that present similar structural characteristics.

This chapter was structured as follows: after the presentation of the methodological introduction (which includes the process of selecting the territories with which the Southeast Region was compared and justifying this choice), a first section was devoted to identifying the possible competitive advantages (and disadvantages) of the South-East Region, in relation to the group of regions identified as being comparable with it. This analysis focused on those structural features capable of influencing the performance of research, development and innovation of territories such as infrastructure, business environment structure, human resources and knowledge levels, as well as the quality of services in public administration. In this sense, the proposed objective was to identify those key elements at the level of the South-East Region that are the most appropriate to illustrate the state of research and development policies in the South-East Region, compared to other territories, also to identify those issues for which greater efforts need to be made to create the best preconditions for the effectiveness of these policies.

The second part of this chapter focused on the research, development and innovation performance of the South-East Region, compared to the other territories. The benchmarking analysis aimed at identifying the main gaps in the RDI sector of the the

South-East Region compared to other territories classified as "modest innovative" and also to understand in concrete terms the difference between the performances recorded by the South-East Region and those regions classified as "highly innovative" with structural characteristics similar to the region under comparison.

Selecting the group with which the comparison was performed (comparison group)

Correctly selecting the comparison group is a key factor in conducting a regional benchmarking / regional comparison exercise.

A multidimensional approach was used for the regional comparison, based on the following elements:

- Multiple structural similarity conditions for innovation policies, as identified by the European Commission, the Joint Research Center[1].
- Geographic / geopolitical key aspects of the South-East Region: it was taken into account that the South-East Region is a peripheral region, both in the national and the European Union; the region does not include the country's capital city, being at the same time a maritime region.
- Socio-economic development level of the South-East Region: a less developed region, considering the terms used in the ESIF, with a GDP per capita of 24.91% of the EU average;
- Incorporating the South East Region as a "modest innovative" region in the context of the "Regional Innovation Index" developed by the European Commission;
- Possible collaborations or partnerships previously concluded between the South-East Region and other regions of the European Union, justifying their inclusion in the scope of the comparison group.

The first of these elements, considered singularly, is the most representative methodology for the correct identification of the comparison group, according to the European Commission.

Starting from this argument, the selection of the comparison group started with the use of the search engine provided by the European Commission to perform the benchmarking analysis based on the "distance index" established by this methodology.

[1] European Commission, Joint Research Center, "Regional benchmarking analysis of the smart specialization process: Identifying reference regions based on structural similarities", Working Document S3 Series Nr. 03/2014. The document addresses a multilateral methodology for identifying similar territories, based on a series of criteria grouped in 7 dimensions: geo-demographic, human resources and education, technological specialization, sectoral economic structure, size of enterprises, receptiveness and values of institutions. On the basis of these dimensions, a "distance index" resulted, which constituted the degree of structural similarity between regions.

Conclusions

This benchmarking exercise has provided a number of relevant findings in relation to RDI activities in the South-East Region.

- The South East Region performs better than the comparison group in terms of non-RDI expenditures and in-house innovation among SMEs.
- The South-East Region has similar performances with those of the regions included in the analysis in terms of cooperation between innovative SMEs and access to Horizon 2020 funds.
- Lower performances of the South-East Region compared to the analyzed regions are recorded in terms of the funds dedicated to RDI activities (public and, in particular, private) and for the allocation of ESIF funds for RDI, this latter finding being valid also for the other regions of Romania included in the benchmarking analysis.

1.3. Entrepreneurial dynamics in the South-East Region. Areas of smart specialization

1.3.1. Particularities of the entrepreneurial environment in the South-East Region

From the point of view of the entrepreneurial dynamics, the recorded data highlights the "fluctuation" of SMEs in the business environment, presenting their situation one year after their establishment, the period of time until the activity ceases or until their dissolution. Having this in mind, it can be noticed in the South-East Development Region the largest share is held by the active SMEs, which represented 78.2% of the total of the existing SMEs in 2015. The high share of active SMEs compared to those inactive and closed and the situation in the other development regions highlights the fact that private entrepreneurs develop their business by planning a medium and long-term vision. Among the arguments that can explain why some SMEs become inactive or close one year after their registration, there may be a number of issues related to lack of sources of business financing, low development opportunities or lack of labour.

As a general trend valid at national level, the South-East Development Region is not the only one that shows a decrease in the share of SMEs investing in the first year of activity during the period 2010-2015, respectively from 26.9% (2010) to 4.1% (2015). This trend is maintained at national level, where only in the case of 2015 this indicator recorded a slight increase compared to 2014 - from 11.6% to 11.9%. Among the most important causes that generate such entrepreneurial behavior can be mentioned a number of issues related to lack of financial resources and access to financing sources. It can also be mentioned that some SMEs generate the necessary resources for subsistence. The large share of newly created SMEs in the wholesale business is another possible explanation, as the wholesale business does not require major investments.

1.3.2. The profile of entrepreneurs in the South-East Region

At national level, the researches of specialists highlight the fact that, by **age groups**, the highest percentages are entrepreneurs 45-60 years old (37.49%) and 35-45 years old (33.79%), at the other end being entrepreneurs under 25 (1.04%). Also, the average age of entrepreneurs is 44.43 years,

within the analyzed sample, 45.10 for males and 42.93 for women. Age structure is conducive to the development of the SME sector, with about 56% of entrepreneurs less than 45 years old. In this context, the high share of young entrepreneurs (21.34%) aged between 25 and 35 years is also mentioned.

From the point of view of professional training and studies, in 2015, most entrepreneurs had secondary and higher education, respectively 55% of the total number of entrepreneurs in Romania. The tendency is also maintained at the level of the South-East Region, with 57.5% of entrepreneurs in the region having at least secondary education.

At national level, in 2015, 59% of managers or founders of SMEs are men, and only 41% of new active businesses are created and administered by women. In the South-East Region, male entrepreneurs have the largest share - 52% in 2015, with 66.5% of SMEs being set up by male entrepreneurs. Such a distribution of entrepreneurs shows a cultural orientation of Romania towards male administred companies.

1.3.3. Priority Areas of Smart Specialization of the South East Development Region

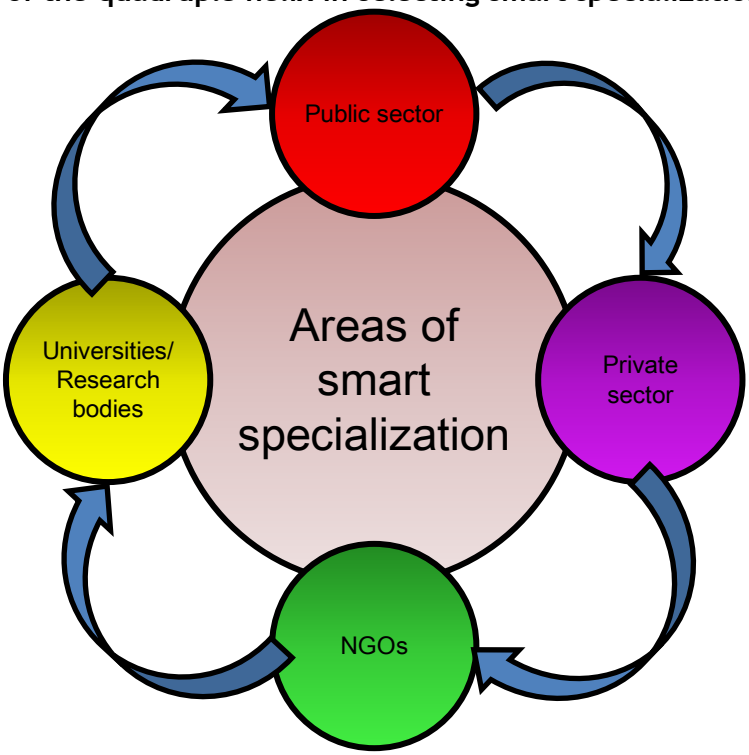
In the South-East Development Region, a quantitative and qualitative analysis was carried out which reveals the most important areas of the economy in terms of development potential in the region. The methodology of selection of the areas of smart specialization comprised three distinct stages:

a. *Identification of areas with smart specialization potential, based on the quantitative and qualitative information derived from the analysis of the regional context and the region's innovation potential;*

b. *Identifying areas with smart specialization potential by analyzing field research results through the results of surveys conducted across the regional business environment and among regional actors relevant for smart specialization;*

c. *Consultation of key actors, relevant in the field of smart specialization, within the focus groups.*

Representatives of the quadruple helix in selecting smart specialization areas



Following these focus groups, at the suggestion of the local stakeholders involved, it was decided to reformulate and complete some areas initially identified. Thus, the areas of smart specialization identified for the South-East Development Region are:

1. Engineering and shipping:

The shipbuilding industry is a field of specialization representative for the South-East Development Region, especially due to the geographic position of Constanta, Galati and Tulcea counties, as well as the existence of a tradition in shipbuilding and ship repair in the region

Construction and repair of ships ➡ The shipbuilding industry in Romania occupies an important place in the European industry, the ships delivered by the Romanian shipyards representing about 5% of the European production;

- Romanian shipyards are the main destination for outsourcing ship production;
- The turnover achieved by the Romanian shipyards is about 650 million EUR annually;
- Naval industry is a vector of development in the South-East Region;
- There are education and research institutions in the naval industry at regional level;
- The existence of the ANCONAV Association, member of SEA Europe;
- Having acomparative advantage of the region (analyzed with Revealed Export Advantage) for product group 89. Ships, vessels and floating structures.

Among the repair services offered can be listed:

repairs to propelled and non-propelled ships;

diagnosis and technical solutions;

repair and reconditioning for marine parts and equipment;

technical interventions for ships at various points on the Romanian Danube sector;

repair of propulsion engines and generators;

repair of mechanical on-board installations.

- ***Shipping*** ➡ Examples of smart specialization directions that are appropriate for developing and increasing the competitiveness the engineering and shipping industry:

- Digitizing some activities in shipping;
- Digitizing port activities;
- Innovative pollution reduction projects caused by harbour activity;
- Use of industrial robots to replace the classical welding formula in the shipyard perimeter;
- Projects to prevent the transfer of contaminated liquid;
- Use of liquefied natural gas engines to protect the environment;
- Use of unconventional materials in shipbuilding (eg Buckypaper).

2. Clothing industry

- Smart development of textiles and clothing industry must consider a strategic reorientation by shifting the emphasis from production based on high volume and low value-added to production based on innovation and, at the same time must stimulate the development of conceptual work and design and the use of new textile materials.

3. Agri-food and fisheries:

The pedro-climatic conditions in the region favor the cultivation of maize (especially in the northern area), wheat (region of the region), barley, industrial plants, sunflower

- ***Agro-food sub-sector:*** Agriculture – vineyard
  - fishing
  - aquaculture
  - legume
- ***Fisheries sector*** *Black sea fishing activities, practiced along the Romanian seaside. The inland fishing activities practiced on the Danube as well as in the Danube Delta area use small wooden boats and do not have mechanized means.*

4. Biotechnologies:

The choice of this area of intelligent specialization is justified by the region's agricultural potential and the need to develop biospheres and protect the environment.

Subsector *Agro-food biotechnologies* ➡ it was chosen as a field of intelligent specialization, based on the following arguments:

- agro-food biotechnologies contribute to the conservation of natural resources, the reduction of CO_2 emissions, the improvement of soil quality and high productivity;
- agro-food biotechnologies can deliver products with increased quality and safety under conditions of more efficient use of resources and environmental protection;
- the economic contribution of biotechnology to agriculture at EU level is 36%;
- in 2030 the use of biotechnologies is estimated to contribute to about 50% of agricultural production.

- ***Environmental biotechnologies*** ➡ The environmental biotechnology subsectorhas been chosen as a field of smart specialization in the region because:
- Environmental biotechnologies are effective in sustainable development based on pollution reduction;
- Pollution is a global and regional challenge;
- Waste management is based on three principles: collection, recycling and reuse for value-added products;
- Biodiversity must be preserved through biotechnology;
- There is a great biodiversity in the region;
- There is a great potential for clustering in the field of environmental protection;
- Higher use of biodegradable waste and by-products through biotechnological processes can increase welfare levels in the region by creating new jobs, improved living conditions

5. Eco-technologies:

They can be a viable solution to tackle key environmental issues, helping to protect and preserve the environment, and to make better use of scarce resources.

- **Efficient and energy-efficient technologies** ➡ The arguments used for establishing the field of ecotechnologies as a field of smart specialization in the South-East Region are:
  - The measures taken in Paris and Graz for the energy sector to reduce global warming are entirely missing from the Romanian Energy Strategy project;
  - Ecotechnologies are a high added value domain;
  - Ecotechnologies observe the environment and subscribe to its sustainability;
  - The need to capitalize already started projects in the field of ecotechnologies.
- **Equipment for the production of bioresources** ➡ The South-East Development Region has a great potential for innovation in renewable energy. Among these are:
- Wind energy;
- Solar energy;
- Water energy;
- Geothermal energy;
- Biomass energy.

6. Tourism:

The South-East Region comprises almost all forms of relief: the Danube meadow, the Baragan Plain, the Dobrogea Plateau with the Măcin Mountains, and the North-West part of the region comprises a part of the Carpathians and the Curvature Subcarpathians. At the same time, the region is crossed by the Danube River, it encompasses the Danube Delta and is bordered to the East by the entire Romanian Black Sea seaside.

- **Traditional tourism (coastal tourism, Danube Delta, mountain, etc.)** ➡ According to the tourism studies conducted at the level of the region in the preferences of foreign tourists there are:
  Tulcea County;
  Constanta county;
  The Danube Delta;
  Black Sea Coast.
- **Balneary tourism** ➡ Local authorities pay particular attention to the development of tourism in the area and act in the following directions:
- Creating tourist programs for disadvantaged groups;
- Development of general infrastructure;
- Development of tourism infrastructure (parks, entertainment parks, tourist ports, landscaping)
- **Niche tourism** ➡ Among the most common forms of niche tourism we can mention:
- Bird watching;
- Photo safari;
- Gourmet;
- Oenological.

7. ICT, High Tech, Nanotechnologies and Advanced Materials

ICT, High Tech, Nanotechnologies and Advanced Materials has been proposed as a smart field of specialization of the South-East Development Region because:

- The ICT industry is a benchmark for economic growth in Romania, accounting for 6-7% of GDP;
- The added value of the sector is superior to other economic sectors and with great export potential;
- Romania ranks first in the EU in the use of ultra-fast broadband services;
- Development of Galati Software Park;
- The existence in the region of education and training centers with a tradition in the field of information technology;
- Labor force in the field with a high degree of specialization

1.4 SWOT Analysis

A smart strategy involves knowing the strengths and weaknesses that define a territory, good governance and straightening efforts in a common direction of all stakeholders or key actors. The SWOT analysis is the tool for identifying the strengths and weaknesses of a region as well as the opportunities and difficulties it faces. It has the role of creating a clear vision of the elements with potential for capitalization and their arrangement in the form of priorities.

The development of the SWOT analysis was the next essential step in setting up the smart specialization strategy, carried out after analyzing the current context of the territory, being necessary to substantiate a well-established plan of future investment in RDI.

SWOT ANALYSIS – Strengths:

- The evolution of the regional GDP over the analyzed time horizon shows an increase of approximately 24% between 2010 and 2015.
- The share of gross investment in services increased in 2010-2015 in the region.
- Although the trend is descending both at European and national level, the share of GDP for investment is higher in Romania than the European average.
- The increased specialization potential of the South-East Region in the wholesale and retail commerce; repair of motor vehicles and motorcycles, its global utility index calculated for 2011-2015 increasing from 3.54 to 4.17.

- Increase of expenditures for research and development activities in Constanta, Galati and Tulcea counties in 2015.
- Increase in the number of researchers between 2010 and 2015 from 1302 researchers to 1364.
- Existence of 3 national research and development institutes with an activity related to marine ecosystem research, ecology, resource management, marine geophysics and geoecology.
- Presence of 7 higher education institutions in the region (public and private).
- The operation of a significant number of research and development centers in agriculture and fish farming.
- Research and development activities carried out by private capital companies.
- The existence of a technology information center in Tulcea county, in the field of environment, tourism and sustainable development.
- The existence and functioning of 12 clusters in the South-East Region.
- Increase in number of patent applications filed at the State Office for Inventions and Trademarks in Romania by Romanian applicants in Buzau County in 2015.
- Increase of the volume of exports in Tulcea and Vrancea counties between 2011 and 2015.
- The South-East Region has the largest number of employees in the industry, "water distribution, sanitation, waste management, decontamination activities".

SWOT ANALYSIS - Weaknesses:

- Reduced employment rate of human resources (62.8%) compared to other development regions (sixth out of eight).
- Recording an increased unemployment rate in the South-East Region.
- The South-East Region has a relatively low average monthly nominal earnings compared to other regions in the country (the penultimate at national level in 2015 - 1,600 lei).
- Growing but low number of innovative businesses.
- The share of gross investments in industry has decreased.
- Deficit balance of trade balance for almost all counties of the region, except for Constanta, which presented only one year of deficient balance, and Buzau.
- Only two counties in the South-East Region - Constanta and Galati - exceed

the national average in terms of the value of the competitive potential index, with the main branches being shipbuilding and metallurgy respectively.

- The South-East Region has the lowest percentage of RDI expenditures in the country, as a percentage of GDP, in 2014, this figure being only 0.06%;
- Reducing the number of RDI personnel from 996 persons in 2010 to 797 persons in 2014;
- Local units implementing RDI activities in 2014 in the South-East Region represented only 3.27%, the lowest percentage at national level.
- The South-East Region is in the category of low-innovative regions.
- Reducing of the number of innovative businesses from 1108 in 2012 to just 560 in 2014.
- The small number of patent applications filed annually with the European Patent Office.
- Braila County has a poor trade balance for all analyzed years (2011-2015).
- The reduced quality of the existing governance at the level of the South-Eastern Region, according to the classification of the regions of the countries of the European Union.

SWOT ANALYSIS – Opportunities:

- Implementation of the National Strategy for Research, Development and Innovation 2014-2020.
- Existence of non-reimbursable funds through ROP 2014-2020, to increase the competitiveness of SMEs and through NRDP, to increase the competitiveness of the agricultural sector.
- Existing financing opportunities to improve technological transfer through the 2014-2020 Regional Operational Program, Priority Axis no. 1.
- Existence of grants through the Operational Program Competitiveness 2014-2020 - Priority Axis 1. Research, Technological Development and Innovation (RDI) in support of economic competitiveness and business development.
- At county level, the highest number of graduates at pre-university level is recorded in Constanta, followed by Galati, the last being Tulcea.
- The existence of the Constanta and Galati universities in the region.
- The presence of industrial clusters, especially for the traditional industries of the region.
- Existence of national programs for financing research and development

activities that will be launched in the period 2017 - 2020.

- Sources of external financing of RDI activities.
- Governance through greater involvement of SMEs and the educational environment in the regional development process of the South-East Region in the context of the smart specialization strategy.
- The high potential for regional development through innovation within the South-East Region.
- Existence of cross-border development opportunities.

SWOT ANALYSIS – Threats:

- High degree of specialization of other regions (Center, Bucharest - Ilfov, North - West) in competitive areas at national and international level.
- Emigration of a large number of researchers at national level;
- Increasing economic and social problems related to poverty in the less developed areas of the South-East Region.
- The existence of a small number of funding sources supporting the smart specialization and implicitly the innovative activities in the region's economy.
- The reluctance of the private environment to invest in RDI activities.
- Bureaucracy in the local public administration.
- Legislation unfavorable to the development of some RDI activities.
- The existence of informal networks.

1.5. Conclusions of the analysis

The qualitative and quantitative detailed analysis of the South-East Development Region reveals a predominantly positive development, which is below the national average. Thus, the analysis of some indicators shows that the region has the potential for economic and social development in the coming years, but all the actors involved have to make consistent efforts.

The processing of available data regarding the activities of the national economy for the period 2011-2015 in the South-East Region reveals a number of trends in the region's specialization potential. At regional level, over the five years under review, there are some economic activities that dominate the activity of the active units in the region, such as: manufacturing, wholesale and retail commerce; repair of motor vehicles and motorcycles, agriculture, forestry and fishing, transport and storage, constructions, water distribution; sanitation, waste management, decontamination activities.

It is important to emphasize that, from the analysis of a significant number of economic and social indicators, Constanta county has a higher development than other counties in the region. This fact is directly correlated with the much more developed transport infrastructure in this county, but also with the fact that Constanta is an important economic and touristic center of Romania and has benefited from consistent investments in recent years. Moreover, Constanta harbour is the largest harbour in Romania, and the city is also an important university center.

The analysis of the economic and social indicators brings to the foreground a range of areas with smart specialization potential in the South-East Development Region. These areas were discussed and analyzed in focus groups conducted at regional level with relevant actors belonging to the quadruple helix: the public sector, the private sector, NGOs and universities. The proposed areas of smart specialization are:

- **Engineering and shipping:**
  - Construction and repair of ships;
  - Shipping;
- **Clothing industry;**
- **Agri-food and fisheries:**
- **Biotechnologies:**
  - Agro-food biotechnologies;
  - Environmental Biotechnologies;
- **Eco-technologies:**
  - Efficient and energy-efficient technologies;
  - Equipment for the production of bioresources;

- **Tourism:**
    - **a. Traditional tourism (coastal tourism, Danube Delta, mountain, etc.);**
    - **b. Balneary tourism;**
    - **c. Niche tourism.**
- **ICT, High Tech, Nanotechnologies and Advanced Materials.**

These areas of expertise have the potential for smart specialization at the level of the South-East Development Region and can become industries in which the region can establish long-term partnerships both at national and international level and may have a say in research, development and innovation.

Chapter II. Regional governance: ensuring participation and ownership

According to the Organization for Economic Cooperation and Development, each country's **governance and regional development strategy** should be based on:

- *promoting and developing entrepreneurship,* supported by a very good selection of entrepreneurial initiatives implemented in each region. The smart specialization approach requires an "entrepreneurial selection" of market opportunities (for example, to minimize failures and to avoid inappropriate political decisions).

- *promoting platforms and general purpose technologies (GPT).* Given the range of general purpose technology applications, technology platforms involving public and private actors, as well as the organization of standards settings can boost productivity in existing sectors, or help to identify sectors where resources should be focused.

- *planning with diagnostic tools and infrastructures and indicators.* Smart specialization requires regions and countries to maintain an infrastructure and an indicator base. Also, in most technological areas there is a match between technological and economic performance. However, there are cases where some areas are economically strong in the country, but from a technological point of view they are very poorly developed. This information could help decision makers assess the sustainability of traditionally strong sectors or highlight areas where research capacity is high but the level of economic development is low. Also, new activities can be identified that match the existing capacities in the region, although these opportunities have not been capitalized before.

- *Strategic governance for smart specialization.* Three types of strategic capabilities are needed to understand future opportunities:

  - the ability to identify strengths throughout the development region;
  - the ability to align political actions and build a critical mass;
  - the ability of regions to develop a vision and *implement the strategy*.

Therefore, the role of strategic intelligence as a tool for governing smart specialization is important. In practice, the link between policy instruments and prioritization is not explicit in the vast majority of regions and

countries. Many decision-makers find it difficult to move from "the prioritization process" to the process of developing policy instruments and the corresponding budget. In most cases, the prioritization process is disconnected from the budget process. Additional governance challenges arise in terms of creating two-way communication channels, attracting and employing qualified staff in agencies and ministries (the latter is a major challenge especially for smaller and more remote regions, in the context of constraints on public finances and public sector employment).

Opening up to other regions: The region's specialization strategy should integrate the fact that other regions are also involved in knowledge-creation activities and that duplication could lead to less efficiency and, ultimately, failure. Therefore opportunities for cooperation with other regions with complementary capabilities and strategies need to be identified.

The proposed partnership structure for co-ordinating the governance of the Regional Framework Document / South-East Smart Specialization Strategy in 2014-2020 is called the Regional Innovation Consortium.

The Regional Innovation Consortium (RIC) is a consultative structure, without legal personality, coordinated by the South-East Regional Development Agency, consisting of academics, research bodies, innovative enterprises, public authorities and civil society, with a role in advising and monitoring the RIS3 strategy at the level of the development region, endorsing the regional framework document elaborated for the programming of the Axis 1 - Promotion of the technological transfer within the Regional Operational Program (ROP) 2014-2020, approving th RIS3 Priority Projects portfolio at the level of each region, analyzing and prioritizing projects for innovation and technological transfer structures, according to Axis 1 of ROP 2014-2020. The number of members of the Regional Innovation Consortium is up to 46 people.

The role of the Regional Innovation Consortium in the South-East Region is to:

- provide feedback on the structure and mix of policies included in South-East RIS3 Strategy;
- approve the South East RIS3 Strategy;
- approve the Regional Conceptual Note elaborated for the programming of the Axis 1, ROP 2014-2020;
- endorse the portfolio of priority projects of the South East RIS3 Strategy;
- analyze and prioritize the projects for the innovation and technological transfer structures, according to Axis 1, ROP 2014-2020;

- proposes estimated date of possible processes for updating / reviewing the South East RIS3 Strategy;
- helps to identify the sources of information needed to monitor and evaluate the South East RIS3 Strategy;
- proposes possible structural and legislative changes;
- proposes and monitors interregional cooperation initiatives;
- endorses the Annual Implementation Reports of the South East RIS3 Strategy;
- identifies and attracts funding sources for the South East RIS3 Strategy evaluation studies.

The Regional Innovation Consortium comprises representatives of the following categories of institutions / entities / organizations:

- ***Research / education***;
- ***Entrepreneurship***;
- ***Public administration***;
- ***Civil society***.

Chapter III. Development of a global vision for the future of the region

In order to develop a vision for the smart development of the South-East Region, desk and field research activities were carried out at the level of the South-East Region, involving key actors from the region (representatives of the quadruple helix), attempting a strategic approach to economic development through specific support for research and innovation in specific areas. Thus, the identification of areas with significant strategic potential, the development of stakeholder governance mechanisms, the establishment of strategic priorities and the use of smart policies to maximize the knowledge-based development potential of the South-East Region were sought.

In order to have a significant impact on the economic development of the region, the smart specialization strategy must focus on a limited number of areas with innovation potential so that they are properly developed and capitalized in order to generate a considerable impact on the region and to produce greater added value in the territory.

The smart specialization vision of the South-East Region is designed to provide the general context for regional decision-makers through which they can plan their future development actions using appropriate tools and techniques to drive development efforts towards those areas identified as having regional innovation potential.

In creating the smart specialization vision of the South-East Region, the analysis and adoption of one of the three categories of scenarios was the main starting point:

- Development based on the current benefits (testing the results of science, applying state-of-the-art technology or a mix of them);
- Socio-economic transformation (through reconversion, identification of new frontiers);
- Recovering gaps: by creating knowledge-based capabilities / abilities.

Selection of the development scenario at regional level

Taking into account the three scenarios for the smart specialization of the South-East Region, as well as a number of factors that condition the implementation of this strategy

at a regional level (such as the current level of development of the region, the applicability of the scenario at regional level, the time needed to implement the initiatives in the strategy), the most appropriate development scenario for the South-East Region was identified as the development of the region based on the current advantages. The point is that it is recommended to implement integrated initiatives by involving all relevant actors at regional level to capitalize on the competitive advantage of the region and to guide actions at territorial level to those areas considered to bring added value to economic activity in the region.

The vision of the smart specialization strategy and its overall goal

The vision of the strategy

- The South-East Region capitalizes the economic and social opportunities specific to the territory and provides the optimal framework for the development of partner initiatives through the involvement of representatives of the quadruple helix (academia, the public environment, the private sector, civil society) so that, integrated actions of smart specialization in the specific fields can be implemented at regional level, which are to determine on a medium and long term, a real growth of the region's competitiveness.

The general objective of the strategy

- **The general objective** of the Smart Specialization Strategy of the South-East Region is to provide a favorable framework for key actors in the region which, by developing concrete action initiatives in the fields of smart specialization, will have a positive impact in relation to the sustainable development of the region.

Chapter IV. Strategic priorities for smart specialization

The identification of priorities at the level of the South-East Development Region was carried out through a detailed analysis of the activities undertaken previously in the process of identifying the priority areas of smart specialization in the region. Thus, attention was focused on a limited number of R & D and innovation priorities, validated by previous entrepreneurial discovery. These priorities will be the areas where the region can actually excel. Priorities have been established with regard to the notion of innovation considered broadly, not only in terms of new products, but also in terms of new processes, new industries, social innovation, new business models and business practices.

The general objective of the Smart Specialization Strategy of the South-East Region is to provide a favorable framework for key actors in the region which, by developing concrete action initiatives in the fields of smart specialization, will have a positive impact in relation to the sustainable development of the region.

In the context of this general objective of the Strategy, a number of strategic priorities have been defined to support its implementation through concrete and achievable objectives. These were divided into cross-cutting priorities and priorities for smart areas.

The cross-cutting (horizontal) priorities are:

1. Supporting the application of Key Enabling Technologies (KET) at the level of smart specialization domains;
2. Supporting the implementation of information and communication technology (ICT) at the level of smart specialization domains;
3. Support for the enterprises implemneting research, development and innovation activities;
4. Supporting innovative clusters;
5. Development of human capital involved in RDI activities.

Priorities for smart specialization areas (strategic priorities):

1. Reducing environmental pollution by using biotechnologies
2. Increasing the quality and quantity of food products through agro-food biotechnology
3. Supporting the adoption of SMART CITY solutions at the regional level
4. Innovative solutions in the shipbuilding and repairing field with minimal impact on the environment
5. Digitalization of ports and shipping transport and reducing the harmful environmental impact
6. Supporting the research, development and innovation to capitalize on alternative energy sources
7. Investments in eco-technologies to reduce the environmental pollution
8. Innovative solutions to promote the tourism
9. Supporting product and process innovation in the clothing industry

In order to ensure consistency between the general objective of the strategy and the smart specialization priorities defined, more specific objectives have been identified, applicable to all identified priorities:

Specific objectives

1. Increasing the share of expenditures with research, development and innovation activities in regional GDP;
2. Increase the number of public-private partnerships conducting RDI activities;
3. Increase the number of staff involved in RDI activities within RDI entities;
4. Creating mechanisms to facilitate the transfer of RDI results to potential users: economic agents, public institutions, NGOs, etc.
5. Increase the number of entities that apply essential generic technologies to the work done.

In the following paragraphs, the transversal priorities and those identified in the areas of smart specialization proposed within the Smart Specialization Strategy of the South-East Development Region will be described, and these will be translated into a series of specific measures.

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Strategic Priority 1. Reducing environmental pollution by using biotechnologies

Biotechnologies ensure a rapid diversification and growth of food, energy, and pharmacologically active compounds through the biodegradation of organic waste, with a significant long-term impact on the quality of life and the protection of the environment. Thus, the main objective of biotechnologies is the development of biotechnological methods, means and products for increasing the quality and quantity of bioresources in the context of climate change and the growing demand for quality food. Biotechnologies have a positive impact on the environment, while also contributing to the economic growth of a region.

The development of biotechnologies will lead to fundamental changes in the agri-food sector, which are so necessary for environmental protection. Thus, genetic material manipulation technology anticipates a way to achieve richer crops by transferring nitrogen fixation genes to plants of major interest in terms of nutrition. Environmental biotechnology is a new way to evaluate and solve emerging environmental problems. Treating pollution as a result of inappropriate use of resources will entail finding optimal solutions for waste recycling and reuse, resulting in both pollution reduction and increased profits.

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Strategic Priority 2. Increasing the quality and quantity of food products through agro-food biotechnology

One of the challenges of Romanian agriculture is the adaptation to new technologies and the adoption of innovative practices, while the necessary funds can be obtained through the National Programme for Rural Development (NRDP) 2014-2020. The concept of the Partnership for Innovation in Agriculture is closely linked to the European Commission's Europe 2020 Strategy, the document underlining the role of research and innovation as key elements in the European Union's adaptation to the challenges of the future. Against this background, the South-East Region's agricultural development strategy should take into account the role of innovation as an indispensable element in the process of regional development and the achievement of competitive advantage.

Improving the performance of the agricultural sector through innovative businesses will have positive effects on micro and macroeconomic stability, help to balance food consumption and agrifood security, increase the share of commercial agricultural holdings and generate jobs,

including the absorption of surplus labor force in agriculture.

Support for smart specialization must be achieved through a set of instruments covering the whole spectrum of creative activities, from idea to market, and the enhancement of collaboration and partnerships between different actors. One of the areas of intelligent specialization for the strategic cycle 2014-2020, identified on the basis of scientific and commercial potential, is the bioeconomy, an area benefiting from the huge potential of Romanian agriculture, in the context of a more active local food industry and growing standards, and global trends such as high demand for food. Smart specialization involves a complex effort to explore and select priority investment areas with economic and innovative potential.

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Strategic Priority 3. Supporting the adoption of SMART CITY solutions at the regional level

SMART cities mean cities that are more enjoyable, inclusive and where technology is not a luxury but simplifies the existence of locals and local government. Smart and Technologized means more educated, healthier, less expensive, more involved in everything the public administration process means, more opportunities for business and citizens, benefits that translate into an improvement of the quality of life - an easier interaction, friendly people with the city, with the environment, with the peers and oriented towards a future supported by integrated smart technologies. The concept goes beyond the relationship between citizens and public service providers and provides the tools that encourage citizens to be more active and to participate more in the community life. For example, to provide feedback on road conditions, adopt a healthier lifestyle, or participate as volunteers in various social activities. In this way, the Smart City will be a more attractive place to live, work and recreate.

At the level of the South-East Development Region, the city of Constanta will benefit from SMART solutions consisting of intelligent parking and street lighting solutions based on LED technology, a pillar with multiple components, including a charging socket electric vehicles and sensors for environmental monitoring, as well as free wi-fi internet. Besides, the fact that there is also a software park in Galati creates the premises for the development of partnerships in order to identify, develop and implement the best SMART solutions in the region.

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Strategic Priority 4. Innovative solutions in the shipbuilding and repairing field with minimal impact on the environment

The South-East Development Region has a particular development potential through the shipbuilding industry. In this area, the shipbuilding and repairing activity of ships where numerous investments of major importance have been made in the last years. In the region one can find the most important shipyards from Romania in Constanta, Midia, Mangalia, Braila, Galati and Tulcea. The long tradition of naval construction has led to the development of educational programs offering highly qualified specialists, sustained research and qualified design. Romanian shipyards are generally specialized in the construction of ships for freight. The main types of ships built here are bulk carriers, cargo tanks, cargo ships, fishing vessels, sea trailers, pushers and barges. The professionalism of Romanian shipbuilders is recognized internationally, Romania being the preferred destination for the production of technical and commercial ships in Europe. At the same time, the related industry has, in recent years, seen a spectacular dynamics that supports the performance of shipyards. All these arguments demonstrate the need for smart specialization of the South East Development Region in the shipbuilding industry and the importance of prioritizing the construction subsection and ship repair.

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Strategic Priority 5. Digitalization of ports and shipping transport and reducing the harmful environmental impact

Harbours and shipping are essential for European transport affairs, for Europe's competitiveness, with huge potential for job creation and investment attraction. Europe's harbours are transit points to the European continent. 74% of non-EU goods are transported via harbours. They are equally important for intra-European trade. Each year, 37% of intra-EU goods traffic and 385 million passengers pass through harbours.

Digitalization of harbours is a priority of the region because, according to the European Commission, Europe's harbours face 3 major challenges:

- By 2030 there is a 50% increase in goods handled in EU harbours. This growth is an opportunity for growth and more jobs: the Commission estimated that between 110,000 and 165,000 new jobs could be created in harbours by 2030. However, Europe's harbours need to

adapt to face an increase in traffic.

- The nature of business activity is changing.
- There are very significant performance gaps between Europe's harbours. At present, three of the best European harbours, Antwerp, Hamburg and Rotterdam represent one fifth of all goods arriving in Europe at sea. The performance gap produces enormous inefficiencies - longer distances, diversions of traffic, longer trips at sea and land, and eventually more transport and more agglomerations to the detriment of EU citizens and the economy. Unless action is taken, this will worsen as traffic increases.

In the context of the accelerated growth of goods handled in harbours, the direction of digitization of shipping is absolutely necessary. All the more so since competitiveness, decarbonisation and digitization are the guiding principles underpinning EU maritime transport policy by 2020 and beyond. These principles seek to ensure that maritime transport remains an attractive way to transport goods and people, making it even more environmentally friendly. It should also be a catalyst for investment and innovation.

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Strategic Priority 6. Supporting the research, development and innovation to capitalize on alternative energy sources

Renewable energy sources (wind energy, solar energy, hydropower, ocean energy, geothermal energy, biomass and biofuels) are alternatives to fossil fuels that help reduce greenhouse gas emissions, diversify energy supply and reduce dependence volatile and unreliable markets for fossil fuels, especially oil and gas. European Union legislation on the promotion of renewable sources has evolved significantly in recent years. At present, there are many energy sources that are renewable and environmentally friendly. In Romania, solar energy is used to produce heat for the preparation of hot water during the hot period. There are already solar houses in several locations.

In the South-East Development Region, Dobrogea became the largest wind farm in Central and Eastern Europe, with Constanta County being hauled with hundreds of turbines with a power of 2.5MW in areas such as Cogealac, Fântânele, Cave, Independence, Chirnogeni, Siliştea, Târguşor, The Cross. One of the largest functional wind farms in Constanta County is in the Cogealac-Fântânele area with 240 turbines and a total installed capacity of 600 MW, while a reactor of the Cernavoda Nuclear Power Station has an electric power of about 700 MW.

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Strategic Priority 7. Investments in eco-technologies to reduce the environmental pollution

Transforming our economies from linear economies into circular economies offers the opportunity to reinvent them and make them more sustainable and competitive. This will stimulate investment and bring benefits both in the short and long term for the economy, the environment and citizens alike. In Romania, the efficient use of resources is low and the circular economy remains poorly developed. Along with Bulgaria and Estonia, "resource productivity" (the economy's efficiency in using material resources to produce wealth) was the lowest in the EU in 2015, standing at 0.31 EUR / kg compared to the EU average of 2, 0 EUR / kg. Not so much the lack of resources as the lack of efficient management of the available resources is what poses problems for the sustainable development in Romania. Romania is lagging behind in adopting the relevant planning tools for waste management. Its waste disposal rate is highest in the EU (82% in 2013). This indicates that resources are not kept in the economy when a product has reached its end of life. A more circular economy, ie focused on recycling and re-use, as well as more efficient use of resources, would help to stimulate investment. It would also generate short- and long-term benefits for the environment, employment and the economy as a whole.

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Strategic Priority 8. Innovative solutions to promote the tourism

The European Regional Development Fund (ERDF) supports the competitiveness, sustainability and quality of tourism at regional and local level. Tourism is undoubtedly closely linked to the use and development of natural, historical and cultural capital and to the attractiveness of cities and regions as living, working and leisure activities. At the same time, it is also closely related to the development, innovation and diversification of visitors' products and services.

Tourism has not been included as a thematic objective in the European Structural and Investment Funds regulations as it is more a means or a sector rather than an objective. However, the regulations provide many opportunities for smart investment in tourism.

Tourism will continue to occupy an important place at the level of ERDF planned investments and related investments for the conservation, protection, promotion and development of natural and cultural heritage, with an allocation from the ERDF of around EUR 8 billion.

These regions have comprehensive strategies to achieve a higher added value not only by investing in tourism innovation but also by stimulating more significant repercussions on other sectors such as the cultural and creative industries, the agri-food sector, construction etc.

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Strategic Priority 9. Supporting product and process innovation in the clothing industry

In a knowledge-based economy, the future of the clothing industry will increasingly depend on the industry's ability to assimilate innovation in order to streamline production processes, organizational structures and commercial operations in close correlation with the changing needs of customers.

The studies and analyzes carried out at the level of the textile industry show that the South-East Development Region has a very high development potential in the clothing sector.

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Horizontal priority 1. Supporting the application of Key Enabling Technologies (KET) at the level of smart specialization domains

As defined by the European Commission, the essential generic technologies or Key Enabling Technologies - KET refers to micro/nanoelectronics, photonics, nanotechnology, industrial biotechnology, advanced materials and advanced manufacturing technologies. Being a trend in the developed world economies, KETs are constantly associated with a highly intensive RDI process with fast innovation cycles, high capital expenditures, and highly qualified labor[2].

From the perspective of Horizon 2020 Progrmme, the industrial and economic competitiveness can only be ensured through essential generic technologies. With applications across multiple industries, KET can bring regional innovation and support the economic growth. At the level of the entire European Union, countries are confronted with the difficulty of translating knowledge into concrete products and services. Production based on KET is declining, with European patents being extensively exploited outside Europe.

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[2] Guide to Research and Innovation Strategies for Smart Specialisation (RIS3), 2012

Horizontal priority 2. Supporting the implementation of information and communication technology (ICT) at the level of smart specialization domains

Currently the human resources and the information are the most important assets of an organization. It is impossible to develop an organization and implicitly a region or country without the use of information and communication technology. In this context, the smart specialization of a region is dependent on ICT, regardless of the field of smart specialization identified.

The Romanian ICT industry produces computing, data and telecommunication equipment, software and services with a positive growth rate. In the software sector, the development is remarkable, and the number of specialists is steadily increasing. At the level of the South-East Development Region there are numerous university centers that prepare ICT specialists, but there is also the software park in Galaţi and various other organizations that can offer jobs. This high-skilled ICT workforce can contribute to the economic development of the region and to the implementation of ICT in all the identified areas of smart specialization

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Horizontal Priority 3. Support for the enterprises implemneting research, development and innovation activities

This priority seeks, first of all, to facilitate the access to financial instruments for enterprises in order to support investment in research, development and innovation, in particular the private ones. Often, the SMEs face difficulties in obtaining loans or in attracting private capital due to the risk they present, due to the low reimbursement capacity as a result of worsening the economic and financial situation, due to the reluctance of financial institutions and due to the limited guarantees they can offer. In addition to the difficult access to finance, the SMEs still face difficulties in gaining access to new technological developments, to knowledge and technology transfer, or to staff with advanced skills (technological risk).

Finanțarea unor proiecte tehnologice inovative care au ca scop realizarea unor inovări de produs sau de proces, va contribui la stabilitatea financiară a întreprinderilor care vor să fie performante pe piață prin producerea și comercializarea unor produse noi sau substanțial îmbunătățite.

The financing of some innovative technological projects that aim to achieve product or process innovation will contribute to the financial stability of businesses that want to be performing on the

market through the production and marketing of new or substantially improved products.

Supporting the innovative enterprises should be linked to the development priorities identified in the South-East Region so that investment in R&D and innovation generates economic growth, primarily at local level.

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Horizontal Priority 4. Supporting the innovative clusters

În viziunea multor experți economici și oameni de afaceri, bazată și pe experiența altor economii europene, clusterele pot impulsiona dezvoltarea economică și pot aduce o valoare adăugată mai mare.

There are currently 12 clusters in the South-East region that are specialized in various fields such as tourism, transport, shipbuilding, clothing, sustainable development, bio-economy, IT, alternative energy, health. In line with the areas of smart specialization identified, it is important to strengthen the existing partner networks by increasing the number of co-operative projects implemented and by strengthening the management and communication capacity at the functional clusters. It should also be mentioned that other new clusters can be developed at the level of the South-East Region in areas such as: food industry, viticulture and petrochemical industry.

Supporting the activity of innovative clusters and other economic cooperation structures must be based on a diversified, modern infrastructure and endowed at European standards both at regional and local level. It is necessary to expand and support the activity of innovative clusters and other structures and networks of cooperation as well as economic promotion activities in the South-East Region. It is also desirable to promote as efficiently as possible the innovative clusters and other cooperation structures and networks as catalysts for the economic development and smart specialization in the region. In addition, in the context of the smartt specialization of the South-East Region, the development or creation of new niches is essential, and this can be achieved through an inter- and cross-sectoral approach.

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Horizontal Priority 5. Development of human capital involved in RDI activities

The smart growth, with a strong focus on education and the development and valorisation of

research, development and innovation, is a vector of convergence in increasing competitiveness and quality of life in all the development regions. In this sense, the human resources in this area have the greatest contribution, while supporting the improvement, diversification and valorisation of their competences, becomes a priority not only at national level but also at regional level.

The specific objective of this priority is to increase the number of researchers and the staff assimilated at the level of the research institutes and the economic agents implementing the RDI activities.

Chapter V. Definition of policy mix and the action plan

The Action Plan of the South-East Development Region in the context of smart specialization consists of a set of pilot projects proposals in the field of research, development, innovation, transmitted by the key actors in the region that activate in the field of RDI and which can contribute to the efficient implementation of the smart specialization strategy. The proposals for smart specialization pilot projects are directly linked to the strategic priorities for smart specialization established at the regional level. The proposed project portfolio emphasizes the role of the key actors in the region within the entrepreneurial development process and it is an instrument through which the strategy can be effectively implemented and orientated towards achieving the proposed objectives and results. In addition to this role, the Action Plan of the South-East Development Region aims to identify the potential sources of funding and the eligible beneficiaries.

The Strategy Action Plan proposes to target the efforts of the key players in the South-East Development Region to achieve common objectives and to act in a coordinated and coherent manner to reach the results and to create synergies in the identified fields of smart specialization.

Key lines of action corresponding to the identified priorities

As a result of the exhaustive analysis carried out for the elaboration of the Smart Specialization Strategy of the South-East Development Region, a set of priorities (9 strategic priorities corresponding to the fields of smart specialization and 5 horizontal priorities) were identified and proposed and then there were etsablished its specific objectives, that were later transposed into concrete measures and specific lines of action for the regional development.

The key action lines outlined below are the most relevant measures from the proposed set for each strategic priority, which have a high degree of maturity and can be immediately transposed into project ideas or concrete implementation actions.

Strategic priority	Key action lines (Priority measures)	Specific objectives
Strategic Priority 1. Reducing environmental pollution by using biotechnologies	• Supporting the creation of enterprises that have as object the research and development activities in biotechnology; • Supporting the training activities of the staff employed in organizations that develop and use biotechnologies; • Facilitate the partnerships with national or international entities active in the field of biotechnologies where the RDI element is integrated, in order to ensure an exchange of experience and / or specialized staff;	1. Increasing the share of expenditures for reserach, development and innovation activity in the regional GDP; 2. Increasing the number of public-private partnerships implementing RDI activities; 3. Increasing the number of staff involved in RDI activities at the level of RDI entities; 4. Creating mechanisms to facilitate the transfer of RDI results to potential
Strategic Priority 2. Increasing the quality and quantity of food products through agro-food biotechnology	• Establishing clusters / operational groups in the agri-food sector at the level of the South-East Region; • Improving research infrastructures in the agri-food sector and encouraging public-private partnerships.	
Strategic Priority 3. Supporting the adoption of SMART CITY solutions at the regional level	• Supporting investments to purchase the hardware and software tools needed to implement RDI activities in the field of SMART CITY solutions; • Support for the professional training activities in order to develop the skills needed in the SMART CITY adoption process; • Supporting IT clusters for the development of SMART CITY solutions at the regional level;	
Strategic Priority 4. Innovative solutions in the shipbuilding and repairing field with minimal impact on the environment	• Supporting the investments for procurement of equipment, hardware and software tools needed for the research, development and innovation in shipbuilding and repair field; • Support for public-private partnerships for research, development and innovation in shipbuilding and ship repair field.	
Strategic Priority 5. Digitalization of ports and shipping transport and	• Support for investment in procurement of hardware and software tools needed to digitalizethe ports and shipping transport; • Facilitate the participation of R&D and innovation entities in the region	

Strategic priority	Key action lines (Priority measures)	Specific objectives
reducing the harmful environmental impact	that are engaged in digitization of shipping in various national and international partnerships; • Support for the development of public-private partnerships for research and development in the field of digitization of ports and shipping.	users: economic agents, public institutions, NGOs, etc. 5. Increasing the number of entities that apply Key Enabling Technologies within the implemented activities.
Strategic Priority 6. Supporting the research, development and innovation to capitalize on alternative energy sources	• Development of energy agricultural crops – crops addressed to obtain products such as biofuels (biodiesel, ecological diesel) and electric or thermal energy; • Realization of experimental research on the use of marine energy produced by the Black Sea (wave energy); • Realization of investments in the transport infrastructure of energy produced from renewable sources;	
Strategic Priority 7. Investments in eco-technologies to reduce the environmental pollution	• Use of pollution prevention technology (video monitoring of high risk areas); • Realization of investments in the environmental quality monitoring systems; • Organizing competitions / project ideas in ecoinnovation.	
Strategic Priority 8. Innovative solutions to promote the tourism	• Promoting the ecological tourism in the protected areas; • Developing new innovative routes; • Implementation of innovative technical solutions for the simplification of tourist activities on the one hand and on the other hand for the increase of tourist's security (mapping of tourist routes with GPS); • Development of e-tourism in order to ensure the best possible promotion of the existing tourism potential in the South-East Regions, especially for attracting foreign tourists.	
Strategic Priority 9. Supporting product and process innovation in the clothing industry	• Using advanced IT solutions in the production process; • Creating technological incubators in the clothing and textiles sector by capitalizing on non-reimbursable financing opportunities; • Financing research and development-innovation projects in the field of textiles and clothing for the creation and testing of experimental	

Strategic priority	Key action lines (Priority measures)	Specific objectives
	products, from the category of "smart textiles" (light shirts, energetic clothing, powders that check the health of the individual, etc.).	
Horizontal priority 1. Supporting the application of Key Enabling Technologies (KET) at the level of smart specialization domains	• Support for investments in the procurement of equipment, hardware and software tools necessary for KET research, development and innovation; • Support for the training activities of the staff involved in RDI activities in order to develop skills necessary for the application of essential generic technologies.	
Horizontal priority 2. Supporting the implementation of information and communication technology (ICT) at the level of smart specialization domains	• Supporting investments for procurement of hardware and software tools necessary for the technology computerization and transfer; • Support to create and ensure the functioning of integrated electronic platforms at the regional level to ensure the dissemination of RDI activities results and to allow the posting of announcements to identify potential partners for RDI project submission.	
Horizontal Priority 3. Support for the enterprises implemneting research, development and innovation activities	• Supporting the acquisition of patents by small and medium-sized enterprises in the South-East Region; • Supporting the training activities of the staff employed to develop the necessary skills in the innovation process; • Developing innovation advisory services in the form of integrated service packages (consultancy, assistance and training services in terms of knowledge transfer, acquisition, protection and use of intangible assets, use of standards and regulations that contain them).	
Horizontal Priority 4. Supporting the innovative clusters	• Promoting the activity of innovative clusters to expand the partner network with new members; • Supporting the use of specific management tools to increase the involvement of members in the implementation of technological transfer and know-how actions;	

Strategic priority	Key action lines (Priority measures)	Specific objectives
	• Developing cooperation with scientific and technological parks; incubators; design centers, etc. to promote entrepreneurship in emerging industries.	
Horizontal Priority 5. Development of human capital involved in RDI activities	• Attracting talented young people towards the research career by organizing competitions with prizes for the innovative solutions; • Supporting temporary staff exchanges between the public and private research entities; • Support for the implementation of an integrated regional system for the award and recognition of notable RDI results obtained by the researchers and assimilated staff; • Integrating the doctoral students and young pHDs into RDI projects.	

Proposed timeframe

The proposed timeframe for implementing the Smart Specialization Strategy of the South-East Development Region is 6 years covering the period 2018-2023. This period allows the correlation of the indicators established in the strategy with the Program indicators monitored by the South-East RDA within the 2014-2020 ROP and the 2014-2020 COP, their values being reported in 2023.

It is also to be mentioned that the proposed interval allows the measures to be implemented simultaneously, no relationship of interdependence is foreseen between them or ant priority order.

Financing sources

Within the elaborated strategy, there were briefly presented the main sources of funding for research, development and innovation activity in Romania, and more information and details on these programs and funding schemes can be found on the websites dedicated to the specifc funding programs. The funding programs addressed in this strategy are:

- Horizon 2020;
- National Plan for Research - Development and Innovation 2015 - 2020 (NPRDI III);
- Regional Operational Program 2014-2020 (ROP 2014-2020);
- Competitiveness Operational Program 2014-2020 (COP 2014-2020);
- Human Capital Operational Program 2014-2020 (HCOP 2014-2020);
- Sectoral Agriculture and Rural Development Plan - ADER 2020;
- Interreg V-A Romania-Bulgaria Program;
- Black Sea Cross-Border Cooperation Program;
- The Danube Program 2014-2020.

Chapter VI. Integration of monitoring and evaluation mechanisms

In order to ensure a successful and efficient implementation of the Smart Specialization Strategy of South-East Development Region, it is necessary, in addition to the relevance of the actions planned for regional development, to take into account the capacity to monitor and evaluate the results of the implementation actions proposed so as to ensure that the objectives established in the strategy are reached and that the level of compliance with the established action lines is constantly monitored. Also, if necessary, the monitoring and evaluation of the strategy will allow the future actions to be adjusted according to the context of their implementation so that the objectives and outcomes are achieved.

The monitoring process has the role of verifying that the activities are properly planned and whether the funds are properly used to obtain theh immediate performance indicators. At the same time, the evaluation process has the role of analyzing the effects of the actions undertaken (their contribution to the observed changes and measured through the result indicator).

The monitoring activity for the implementation of the Smart Specialization Strategy of the South-East Region can be subsumed, from the perspective of the financial and human resources involved, to the monitoring activity of the implementation of the projects to be funded under the ROP 2014-2020 and COP 2014-2020, in the context of which activities and results of the strategy can be linked to these funding programs, managed at regional level by the South East Regional Development Agency.

Moreover, for monitoring the strategy, it is proposed to collect data and information from sources such as the National Institute for Statistics databases and the ROP and COP Annual Implementation Reports.

In the following section there are presented the indicators proposed at the level of the monitoring and evaluation system of the strategy. The time frame for implementing the strategy is the 2018-2023 period, and the milestones for its assessment are 2020 and 2023, when it is proposed to develop Monitoring Reports for the Smart Specialization Strategy of the South East Region, containing information about the period covered by the monitoring report, a description of the activities carried out in the monitoring process, a presentation of the

measures and actions covered by the monitoring process, and opinions on the progress made in implementing the Smart Specialization Strategy. The monitoring reports will be discussed with members of the Regional Innovation Consortium in order to analyze the progress of the implemented actions and to formulate recommendations for the future implementation of the strategy. Furthermore, the Regional Innovation Consortium will also have the role of evaluating the implementation stage of the strategy, based on the proposed indicators.

a. Context indicators

In line with the development perspective from the smart specialization point of view at the level of the South-East Development Region, the context of regional development will be monitored from the perspective of two dimensions: economic and socio-demographic.

Nr. crt.	Dimension	Proposed indicator	Unit of measure	The estimated evolutive trend
1	Economic	The Gross Domestic Product at regional level	Ron	**++**
2		Active local units	Number	**+**
3		Innovative businesses	Number	**+**
4		Expenses with RDI activity	Ron	**+**
5	Socio-demographic	Workforce	Number	**+/-**
6		Researchers	Number	**++**

b. Results indicators

In order to provide specific indications for the implementation of the strategy, specific objectives have been defined, whose progress is quantified in the following output indicators:

Nr. crt.	Specific objective	Proposed indicator	Unit of measure	The estimated evolutive trend
1	Increasing the share of expenditures in the RDI activity in regional GDP	Share of expenditures with RDI activity in regional GDP	Percentage	++
2	Increase the number of staff involved in RDI activities at the level of RDI entities	Number of staff involved in RDI activities	Number	++
3	Creating mechanisms to facilitate the transfer of RDI results to potential users: economic agents, public institutions, NGOs, etc.	Number of projects that facilitate the transfer of RDI results to potential users	Number	+
4	Increasing the number of entities that apply essential generic technologies in their work	Number of entities that apply essential generic technologies in their work	Number	+

c. Output indicators

At the level of the Smart Specialization Strategy of the South-East Development Region, 9 strategic priorities related to the fields of smart specialization and 5 transversal priorities have been defined, which will synergistically contribute to the achievement of the general objective and the specific objectives proposed within the strategy. For these priorities, the following set of immediate output indicators has been defined.

Nr. crt.	Priority	Proposed indicator	Unit of measure	The estimated evolutive trend
1	Strategic Priority 1. Reducing environmental pollution by using biotechnologies	Number of projects using biotechnologies to reduce pollution	Number	+
		Number of researchers involved in biotechnology development	Number	+
2	Strategic Priority 2. Increasing the quality and quantity of food products through agro-food biotechnology	Number of projects that created safe, affordable, and nutritionally optimized food	Number	+/-
		Number of RDI personnel involved in the development and application of agro-food biotechnologies	Number	+
		Number of entities realizing food using agro-food biotechnology	Number	+
3	Strategic Priority 3. Supporting the adoption of SMART CITY solutions at the regional level	Number of functional partnerships for implementing SMART CITY solutions	Number	+
		Number of RDI staff involved in the development and implementation of SMART CITY solutions	Number	+
4	Strategic Priority 4. Innovative solutions in the shipbuilding and repairing field with minimal impact on the environment	Number of public-private RDI partnerships in the field of shipbuilding and ship repair	Number	+
5	Strategic Priority 5. Digitalization of ports and shipping transport and reducing the harmful environmental impact	Number of public-private partnerships for RDI in the field of digitization of ports and shipping.	Number	+
6	Strategic Priority 6. Supporting the research, development and innovation to capitalize on alternative energy sources	Number of projects using alternative energy sources	Number	+

Nr. crt.	Priority	Proposed indicator	Unit of measure	The estimated evolutive trend
7	Strategic Priority 7. Investments in eco-technologies to reduce the environmental pollution	Number of projects using eco-technologies to reduce environmental pollution	Number	+
8	Strategic Priority 8. Innovative solutions to promote the tourism	Number of projects promoting ecological tourism	Number	++
		Number of projects using innovative technical solutions to simplify tourist activities	Number	+
9	Strategic Priority 9. Supporting product and process innovation in the clothing industry	Number of projects in the clothing field proposing innovative activities	Number	+
		Number of process innovations realized in the clothing industry	Number	+
		Number of product innovations realized in the clothing industry	Number	+
10	Horizontal priority 1. Supporting the application of Key Enabling Technologies (KET) at the level of smart specialization domains	Number of projects providing Key Enabling Technologies - KET	Number	+/-
		Number of RDI staff involved in projects providing key enabling technologies (KET)	Number	+
11	Horizontal priority 2. Supporting the implementation of information and communication technology (ICT) at the level of smart specialization domains	Number of contracts related to the consolidation of technology transfer partners relationships	Number	+
		Number of employees involved in ICT implementation at the level of smart specialization domains	Number	+
		Number of contracts / agreements to achieve	Number	+

Nr. crt.	Priority	Proposed indicator	Unit of measure	The estimated evolutive trend
		technology transfer		
12	Horizontal Priority 3. Support for the enterprises implemneting research, development and innovation activities	Total RDI spending at the level of smart specialization domains	Ron	+
		Number of employees performing RDI activities at the level of smart specialization domains	Number of persons	+
		Number of patents registered by private entities	Number	+/-
13	Horizontal Priority 4. Supporting the innovative clusters	The number of new RDI-based services developed by clusters for active partners	Number	+/-
		Number partners registered to clusters	Number	+
		The number of new RDI clusters in smart specialization areas	Number	+
14	Horizontal Priority 5. Development of human capital involved in RDI activities	Number of RDI staff in the public and private environment	Number of persons	+
		Number of RDI staff benefiting from training	Number of persons	+

Conclusions

The Smart Specialization Strategy of the South-East Region was developed on the basis of a holistic analysis of the regional specificity, resulting a series of conclusions regarding the specialization potential and the specific advantages of the territory. These can be addressed from the perspective of smart specialization and can ensure the achievement of the proposed objective for the strategy to provide a favorable framework for the key actors in the region who, through the development of concrete action initiatives in the areas of smart specialization, will have a positive impact on the sustainable development of the region. The analysis was complemented by the results of quantitative research (questionnaires applied to key actors in the region, representatives of the quadruple helix) and qualitative research (focus groups organized with key actors in the region for each smart specialization domain).

The smart specialization of the South-East Region is an ambitious objective, which involves a complex process of structural changes planned for the medium and long term, but whose results can lead to a fundamental transformation of the existing socio-economic climate at regional level.

The elaboration of the Smart Specialization Strategy for the South-East Region would not have been possible without the support and involvement of the key decision-makers and key actors in the region. Thus the team that elaborated the strategy would like to thank the representatives of the public institutions, academic, private environment and civil society who have been actively involved in providing support and relevant opinions on the smart specialization potential in the region throughout the activities of the contract.