



Comparing the national Smart Specialization Strategies (3S) of the SEA-EU countries - Report in the best practices of cooperation within the socio-economic sector



















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1. Introduction with methodology

National/Regional Research and Innovation Strategies for Smart Specialization (RIS3 strategies) are integrated, place-based economic transformation agendas that do five important things³:

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

The preliminary analysis concerning common areas in the Smart Specialization Strategies (S3) in partners' regions was prepared at the stage of preparing the project proposal. The most important aspects seem to be as defined below.

According to the European Commission publication "Europe's regional research systems: current trends and structures", research and innovation are intricately and systemically linked processes in the framework of a larger, knowledge driven socio-economic system. The system should be convergent with the Smart Specialization Strategies (S3) defined for each EU region. These are implemented in all SEA-EU partner regions.

During the proposal at preparation stage, the analysis of the Smart Specialisation defined for Andalusia (UCA), Bretagne (UBO), Schleswig-Holstein (CAU), Pomerania (UG), Croatia (UNIST) and Malta (UM) has identified various common areas. According to the Smart Specialisation Platform (http://s3platform.jrc.ec.europa.eu/), Joint Smart Specialisation fields concentrate mainly on:

- Maritime and Blue Growth aspects such as Maritime Activities Blue Growth (Bretagne), Offshore, port and logistics technologies (Pomerania), Aquaculture, Maritime Services (Malta), Maritime economy (Schleswig-Holstein);
- Health aspects such as: Health and wellbeing (Bretagne), Medical technologies in the area of civilization and ageing-associated diseases (Pomerania), Health with a focus on healthy living and active ageing, and e-health, ICT in health, digital (Malta), Nutrition industry (Schleswig-Holstein), Health and Quality of Life (Croatia), Health and well-being systems, Healthy and safe food (Andalusia);

³ NATIONAL/REGIONAL INNOVATION STRATEGIES FOR SMART SPECIALISATION (RIS3: <u>https://ec.europa.eu/regional_policy/sources/docgener/informat/2014/smart_specialisation_en.pdf</u>

















- Energy aspects such as Eco-effective technologies in generation, transmission, distribution and consumption of energy and fuels, and in construction (Pomerania), Resource efficient buildings (Malta), Renewable energies (Schleswig-Holstein), Energy and Sustainable Environment (Croatia), Promotion of Renewable Energies, Natural resources management (Andalusia);
- Advanced technologies aspects for industrial applications (Bretagne), interactive technologies in an information-saturated environment (Pomerania), high value-added manufacturing with a focus on processes and design, aviation and aerospace (Malta); ICT and media (Schleswig-Holstein); and advanced transport systems and advance manufacturing and the digital economy (Andalusia).

Country	Position	Smart specialisation	ESI Funds total	Example of activity
		priority areas	budget for	
			Research	
			and Innovation	
SPAIN	Spain is a	1. Manufacturing &	€ 7,6 Billion	Technology transfer: The MACbioIDi
	Moderate	industry		Project transfers medical technology
	Innovator	2. Sustainable	(EU € 5,0 Billion,	developed mainly in the Canary Islands and
		innovation	National	Madeira to territories in the Macaronesia
		3. Key Enabling	€ 2,6 Billion)	region (Canary Islands, Madeira, Azores,
		Technologies		Cape Verde), Mauritania and Senegal
		4. Human health &		through joint educational programs.
		social work activities		
		5. Information &		
		communication		
		technologies		
FRANCE	France is a	1. Manufacturing &	€ 3,9 Billion	Entrepreneurship: Big Booster (Lyon) offers
	Strong	industry		mentoring to biotech, health, technology
	Innovator	2. Sustainable	(EU € 1,9 Billion,	and information start-ups, and the
		innovation	National	opportunity to showcase their products and
		3. Key Enabling	€ 2,0 Billion)	services. Entrepreneurs learn how to
		Technologies		compete in the international market.
		4. Energy production		
		& distribution		
		5. Human health &		
		social work activities		
GERMANY	Germany is	1. Manufacturing &	€ 6,4 Billion	Biopharmaceutical production: MoBiDiK
	an Innovation	industry		(Nordrhein-Westfalen) made a new
	Leader	2. Key Enabling	(EU € 4,0 Billion,	biopharmaceutical production process work
		Technologies	National	in a demonstration plant
		3. Information &	€ 2,4 Billion)	based on modular plug-and-produce
		communication		cnemical production
		technologies		technology. This helps meet the growing
		4. Sustainable		demand for specialised therapies, decrease
		innovation		production costs and leverage
				private funds.

Table 1. S3 national priorities in SEA-EU countries

















Country	Position	Smart specialisation	ESI Funds total	Example of activity
		priority areas	Research	
			and Innovation	
		5 Human health &		
		social work activities		
POLAND	Poland is a	1. Manufacturing &	€ 10 Billion	Aviation & aeronautics cluster: In
	Moderate	industry	0 20 5	Podkarpackie, the development of an
	Innovator	2. Sustainable	(EU € 8.4 Billion.	aviation and aeronautics cluster is helping
		innovation	National	the regional economy diversity from agri-
		3. Key Enabling	€ 1.6 Billion)	food into high-tech industries and creates
		Technologies	,,	links with world class aviation businesses
		4. Information &		and research activities.
		communication		
		technologies		
		5. Human health &		
		social work activities		
CROATIA	Croatia is a	1. Energy production	€ 811 Million	Robotic surgery: Robotic Neuronavigation,
	Moderate	& distribution		or RONNA, is an intelligent navigation
	Innovator	2. Human health &	(EU € 690	instrument that follows pre-op planning
		social work activities	Million,	conducted by neurosurgeons, while the
		3. Transporting &	National	assistant robot is able to perform invasive
		storage	€ 121Million)	surgeries.
		4. Public		
		administration,		
		security & defence		
		5. Key Enabling		
		Technologies		
MALTA	Malta is a	1. Information &	€ 92 Million	Cancer prevention: IMaGenX promotes and
	Moderate	communication		improves breast cancer surveillance and
	Innovator	technologies (ICT)	(EU € 73 Million,	treatment. It has established a network
		2. Services	National	amongst health providers, universities,
		3. Human health &	€ 19 Million)	users and the public and enhances risks
		social work activities		assessments by facilitating data analysis.
		4. Construction		
		5. Key Enabling		
		Technologies		

Source: <u>https://ec.europa.eu/regional_policy/sources/docgener/guides/smart_spec/strength_innov_es_en.pdf</u>, <u>https://ec.europa.eu/regional_policy/sources/docgener/guides/smart_spec/strength_innov_fr_en.pdf</u>, <u>https://ec.europa.eu/regional_policy/sources/docgener/guides/smart_spec/strength_innov_de_en.pdf</u>, <u>https://ec.europa.eu/regional_policy/sources/docgener/guides/smart_spec/strength_innov_pl_en.pdf</u>, <u>https://ec.europa.eu/regional_policy/sources/docgener/guides/smart_spec/strength_innov_pl_en.pdf</u>, <u>https://ec.europa.eu/regional_policy/sources/docgener/guides/smart_spec/strength_innov_pl_en.pdf</u>, <u>https://ec.europa.eu/regional_policy/sources/docgener/guides/smart_spec/strength_innov_hr_en.pdf</u>,

https://ec.europa.eu/regional_policy/sources/docgener/guides/smart_spec/strength_innov_mt_en.pdf

















Table 2. Comparison of the S3 priority areas in SEA-EU countries (national level)

Country/ Smart specialisation priority areas	Spain	France	Germany	Poland	Croatia	Malta
Manufacturing & industry	Х	X	Х	х		
Sustainable innovation	Х	х	X	х		
Key Enabling Technologies	Х	х	x	х	x	Х
Human health & social work activities	x	x	x	х	x	x
Information & communication technologies	х		x	х		x
Energy production & distribution		Х			Х	
Transporting & storage					Х	
Public administration, security & defence					х	
Services						Х
Construction						Х

Source: As above

Table 3. Comparison of the S3 position in SEA-EU countries (national level)

Country/ Smart specialisation priority areas	Spain	France	Germany	Poland	Croatia	Malta
Moderate Innovator	Х			Х	Х	Х
Strong Innovator		Х				
Innovation Leader			Х			

Source: As above

In the 2021-2027 programming period, smart specialization strategies will be required to meet a series of fulfilment criteria for the "enabling condition" of good governance. One such criterion relates to international collaboration, or measures for enhancing cooperation with partners in different areas designated as priority for smart specialization. Interregional cooperation is essential for smart specialization – innovation often depends on exchanges and spill-overs from cooperation between clusters or knowledge hubs, and research and innovation networks are increasingly global.

After analysis of S3 position in SEA-EU countries and S3 national priorities in SEA- EU countries the following common areas were selected: Maritime and Blue Growth, Health aspects, Energy and Advanced technologies. The next step in the preparation of the Comparison of the national Smart Specialization Strategies (3S) at SEA-EU Consortium was the detailed presentation of common areas based on the data selected from EU Smart specialization Platform. The results are presented in the tables below.



















Table 4. Common 3S areas for SEA-EU countries (National level)

	Poland	Germany	France	Malta	Croatia	Spain*
Technologies	Innovative technologies	Civilian security.	Complex Systems	High value-added	Security. Cyber	Digital Economy.
	and industrial processes.	Research and	Engineering and	manufacturing with. a	security, defence	Incorporation of ICT
	Horizontal approach	development for civilian	Software. Applications for	focus on processes and	dual use, and data	infrastructure,
	focusing on advanced	security, cyber-security,	mobility, health and	design	mining action	development, and digital
	materials, sensors and	IT-security and secure	energy/environment		programme.	processes to strategic
	their networks, ICT	identities	supported through			industries, business
	application, printed,		hardware and software			activities, civil society and
	organic and flexible		research.			for the development of e-
	electronics, automation	Innovative work	Digital Creation. Applied	ICT in health, digital.		government. This will
	and robotics, photonics,	environment. Work in a	for mobility, health and	gaming, financial services		include IoT, Big Data, Could
	creative technologies and	digitalised world,	energy/environment,	and tourism product		Computing, etc.
	innovative marine	innovative services for	supported through	development		
	technologies.	future markets and e-	research in imaging,			
		Skills and digital	sound and IT.			
		competences				
		Digital economy and	Photonics and Robotics.	Resource efficient		
		society. Industry 4.0,	Innovative activities	buildings		
		smart services, smart	applied as a horizontal			
		data, cloud computing,	theme.			
		digital networks, digital				
		science, digital				
		education and digital				
		life worlds				















Bio- economy/Blue economy	Bio-economy comprising agri-food, forestry and environment. Innovative biotechnological technologies and products in agri-food, fostery, chemical and environmental engineering. Natural resources and waste management. Technologies of acquisition, processing and use of natural resources, reducing their consumption and re-use of secondary raw materials as materials or			Aquaculture Maritime Services	Food and Bioeconomy. Sustainable food production and processing.	Healthy and safe food. Innovation in agri-food industry, including functional and customized food habits; food safety traceability; aquaculture and fish industries with the exploitation of opportunities resulting from green and blue economy. Natural resources management. Research and innovation on sustainable management of natural resources; improved competitiveness of agriculture and cattle industry; CO2 capture by natural and cultivated
	energy sources.					ecosystems; water cycle management. Bio based
Health	Healthy Society. New	Healthy life. Combating	Digital Creation. Applied	ICT in health, digital.	Health and Quality	Health and well-being
	medical and medicinal	common illnesses,	for mobility, health and	gaming, financial services	of Life.	systems. Fostering the
	products and	individualised medicine,	energy/environment,	and tourism product	Pharmaceuticals,	public health and welfare
	technologies of their	prevention and	supported through	development	bio-	systems through new
	manufacturing; diseases	nutrition, innovative	research in imaging,		pharmaceuticals,	integrated models of health
		care, research on active	sound and IT.		medical	and well-being





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	diagnosis and advanced therapy methods.	substances and innovative medical technology	New Medical Devices. Medical devices to improve patients care, diagnosis and treatment, and autonomy notably through robotics and photonics applications.	Health with a focus. on healthy living and active ageing, and e-health	equipment and devices; health services and new methods of preventive medicine and diagnostics; and nutrition.	management based on e- health and big data exploitation; biotechnology, regenerative medicine, healthy leaving and ageing
Energy	Sustainable energy. Smart and energy efficient construction, high efficiency, low-emission and integrated circuits of manufacturing, storage, transmission and distribution of energy (smart grid), and sustainable transport solutions.	Sustainable economy and energy. Energy research - energy storage, electricity grids, photovoltaic construction & energy efficient cities, green economy, bio-economy, sustainable agricultural production, securing provision of raw materials, future city, future	Digital Creation. Applied for mobility, health and energy/environment, supported through research in imaging, sound and IT.	Energy and Sustainable Environment. Energy technologies, systems and equipment; environment friendly technologies, equipment and advanced materials.		Promotion of Renewable Energies. and Energy Efficiency - generation and integration systems of renewable energies. smart energy networks (smart grids): capture, transformation, transport and storage. high capacity energy storage systems. efficient energy







Mobility/Tourism		Intelligent mobility. Intelligent traffic, infrastructure, innovative mobility concepts and networks, e-mobility, automotive technologies, aeronautics and maritime technologies	Complex Systems Engineering and Software. Applications for mobility, health and energy/environment supported through hardware and software research.	Tourism product development	Mobility. Added value manufacturing of road and rail vehicles parts and systems; environmentally friendly transport solutions; and Intelligent transport systems	Advanced Transport Systems and advance manufacturing. Development of Advanced Transport Systems, new materials and production processes for the transport industry, including autonomous systems (UAV, AGV); new developments in electric vehicles;
		Eco-Construction and Urban Management. Innovative technologies applied for new services and products in mobility, construction and energy/environment.	Aviation and aerospace	transport systems and logistics.	Transport and logistics. Innovative business activities on logistics and transport, particularly regarding the major productive sectors in Andalucía (agri-food, aeronautics, energy sectors); mobility and urban transport infrastructures.	
			Intelligent transport without CO2. Intelligent and carbon-free transport to foster mobility and energy/environment, supported through research in light			Transport and logistics. Innovative business activities on logistics and transport, particularly regarding the major productive sectors in Andalucía (agri-food,













*Spain does not have prepared data for national level for this table data for Andalusia [ES61] were used

Source: European Commission Smart Specialization Platform - s3platform.jrc.ec.europa.eu







Table 5. Common 3S areas for SEA-EU countries (Regional level)

		Germany/Schlezwig-				
	Poland/Pomorskie	Holstein	France/Britany	Malta*	Croatia*	Spain/Andalusia
Technologies/	Interactive technologies	ICT and media. ICT for	Technologies for the digital	High value-added	Security. Cyber	Digital Economy.
ICT/ IT	in an information-	maritime economy and	society. (a) Future Internet:	manufacturing with. a	security, defence	Incorporation of ICT
	saturated environment.	logistics, e-energy, e-	communicating objects, cloud	focus on processes	dual use, and	infrastructure, development,
	Multimodal human-	health with telemedicine	computing and big data, b)	and design	data mining	and digital processes to
	machine interfaces;	and imaging processes,	Imaging and content, c)		action	strategic industries, business
	embedded systems for	software systems	Software design, d) Digital		programme.	activities, civil society and for
	intelligent spaces,	engineering, security, e-	modelling, e) Broadcast			the development of e-
	Internet of things; data	Government, micro-	network convergence, fixed-			government. This will include
	transmission, databases,	mechanical and electric	mobile convergence, f)			IoT, Big Data, Could
	data security, processing	components	Cybersecurity)			Computing, etc.
	of large data; space and		Advanced technologies for	ICT in health, digital.		
	satellite		industrial applications. (a)	gaming, financial		
			Photonics and materials for	services and tourism		
			optics, b) Multi-purpose	product development		
			materials, c) Harsh			
			environment technology, d)			
			Electronics, robotics, robotics			
			for industrial engineering, e)			
			Advanced manufacturing			
			systems for small and medium			
			batches (Factory of the Future)			















			Social innovation for an open and creative society. (a) Towards social and community innovation, b) E-education and e-learning, c) Heritage and sustainable tourism, d) Creative and cultural industries, e) Trends and developments in business models across industry	Resource efficient buildings		
Bio-economy	Eco-effective technologies in generation, transmission, distribution and consumption of energy and fuels, and in construction. Improving energy efficiency in buildings and industry; renewable energy sources, distributed generation and prosumer power; smart grid	Nutrition industry. Diversification and individualisation of grocery supply, green biotechnology, conservation and cooling technologies	Sustainable food supply chain. for quality food (a) Food quality and safety, b) New agricultural production models, c) Food Factory of the Future)		Food and Bioeconomy. Sustainable food production and processing.	Healthy and safe food. Innovation in agri-food industry, including functional and customized food habits; food safety traceability; aquaculture and fish industries with the exploitation of opportunities resulting from green and blue economy.













	Off-shore, port and logistics technologies. Universal constructions and technologies for the exploitation of marine resources; vehicles and vessels used in marine and coastal environments; equipment, techniques and systems for monitoring and purifying the				Natural resources management. Research and innovation on sustainable management of natural resources; improved competitiveness of agriculture and cattle industry; CO2 capture by natural and cultivated ecosystems; water cycle management. Bio based
Maritime/Blue		ICT and media. ICT for	Observation, and energy and	Maritime Services	
economy		maritime economy and	ecological engineering		
		logistics, e-energy, e-	Observation, surveillance and		
		health with telemedicine	management of the		
		and imaging processes,	environment, eco-systems and		
		software systems	their interactions - Smart grids		
		engineering, security, e-	 Sustainable and energy 		
		Government, micro-	efficient construction (green		
		mechanical and electric	building and eco-construction,		
		components	ICT) -		















		Maritime economy. Maritime technologies, specialised ship construction, offshore energy (wind, oil, gas), maritime biotechnology, production facilities, wind parks, facilities to refuel ships with LNG or other alternative fuels and innovative harbour infrastructures		Aquaculture		
Health	Medical technologies in the area of civilization and ageing-associated diseases. Modern solutions in prevention, diagnosis and therapy of civilisation diseases and ageing period; support systems for people with disabilities.	Life sciences. Medical technology/surgery technology, pharmaceuticals, biotechnology, diagnostics, therapies, imaging, laboratory equipment and implantology	Health and wellbeing. better quality of life (a) Prevention – health - wellbeing, b) New therapeutic approaches combining genetics, biomarkers and biomolecules, c) Medical, diagnostic and therapeutic technologies and e-health)	ICT in health, digital. gaming, financial services and tourism product development Health with a focus. on healthy living and active ageing, and e- health	Health and Quality of Life. Pharmaceuticals, bio- pharmaceuticals, medical equipment and devices; health services and new methods of preventive medicine and diagnostics; and nutrition.	Health and well-being systems. Fostering the public health and welfare systems through new integrated models of health and well- being management based on e-health and big data exploitation; biotechnology, regenerative medicine, healthy leaving and ageing















Energy		Renewable energies. Services and logistics, biomass, energy efficient technologies, expansion of offshore wind energy, software for renewable energies, energy and drive technology, nano- particles, materials and coatings	Observation, and energy and ecological engineering Observation, surveillance and management of the environment, eco-systems and their interactions - Smart grids - Sustainable and energy efficient construction (green building and eco-construction, ICT) -	Energy and Sustainable Environment. Energy technologies, systems and equipment; environment friendly technologies, equipment and advanced materials.		Promotion of Renewable Energies. and Energy Efficiency - generation and integration systems of renewable energies. smart energy networks (smart grids): capture, transformation, transport and storage. high capacity energy storage systems. efficient energy
Mobility/Tourism	Off-shore, port and logistics technologies. Universal constructions and technologies for the exploitation of marine resources; vehicles and vessels used in marine and coastal environments; equipment, techniques			Tourism product development	Transport and Mobility. Added value manufacturing of road and rail vehicles parts and systems; environmentally friendly transport	Advanced Transport Systems and advance manufacturing. Development of Advanced Transport Systems, new materials and production processes for the transport industry, including autonomous systems (UAV, AGV); new developments in electric vehicles;
	and systems for monitoring and purifying the			Aviation and aerospace	solutions; and Intelligent transport systems and logistics.	Transport and logistics. Innovative business activities on logistics and transport, particularly regarding the major productive sectors in Andalucía (agri-food, aeronautics, energy sectors);

















			mobility and urban transport infrastructures.
			Transport and logistics. Innovative business activities on logistics and transport, particularly regarding the major productive sectors in Andalucía (agri-food, aeronautics, energy sectors); mobility and urban transport infrastructures.
			Tourism innovation. Research, experimentation, demonstration and technology transfer projects in the field of the tourism industry; cultural heritage management; leisure and cultural tourism.

* For Malta and Croatia only data on national level were available

Source: European Commission Smart Specialization Platform - s3platform.jrc.ec.europa.eu







Methodology

The methodology used for the ranking of the SEA-EU member universities is synthetically described as follows. For multivariate analysis it is proposed to use Euclidean distance from the Positive Development Pattern (PDP) to identify those SEA-EU countries, from the **Maritime and Blue Growth**, **Health, Energy, Advanced technologies/High-tech/ICT and Tourism/Mobility** sector point of view, which are characterized by the highest competitive levels. The procedure consisted of the following stages of the calculation:

1. Creating a matrix of EU countries and Indicators

	l ₁	l ₂	I ₃	 Im
E1	X ₁₁	X ₁₂	X ₁₃	 X_{1m}
E2	X_{21}	X ₂₂	X ₂₃	 X_{2m}
E₃	X ₃₁	X ₃₂	X ₃₃	 X _{3m}
En	X_{n1}	X _{n2}	X _{n3}	 X _{nm}

where:

E_{1...n} – EU Country

 $I_{1\dots m}$ – Indicator

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 X_{ij} the value of j-th feature (I - Indicator) of the i-th object (E - EU Country)

2. Due to the fact that the features can be stimulants, de-stimulants or nominants, before going to the next step there should be (if necessary) a procedure to bring uniformity of characteristics (features).



(1)





(3)

(4)

The second step of the calculation is to bring the different variables at comparable standardized levels. As a result of standardization, each variable will have a mean value of 0 and a standard deviation equal to 1. Standardization is made according to the following formula:

$$z_{ij} = \frac{x_{ij} - \overline{x}_j}{s_i}$$
 (*i* = 1,...,*n*, *j* = 1,...,*m*)(2)

where:

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 z_{ii} - standardized value of j-th feature of the i-th object

 $x_{\scriptscriptstyle ij}$ - the value of j-th feature of the i-th object

- \overline{x}_i the arithmetic mean of the j-th features
- s_{i} standard deviation of the j-th features

As a result the output is a matrix:

	slı	sl2	sl₃	 sl _m
E1	Z ₁₁	Z ₁₂	Z ₁₃	 Z_{1m}
E2	Z ₂₁	Z ₂₂	Z ₂₃	 Z_{2m}
E3	Z_{31}	Z ₃₂	Z ₃₃	 Z_{3m}
En	Z_{n1}	Z_{n2}	Z _{n3}	 Z_{nm}

3. The third step was to estimate the Zpj - Positive Development Pattern (PDP) by setting the maximum value in each column of the standardized features.

 $Z_{pj} = Max \{ Z_{ij} \}$ – Positive Development Pattern (PDP)







4. Calculating the distance of each object from the PDP, taking into account the impact of various strength characteristics of the study examined the phenomenon. The Euclidean distance is determined by the formula:

$$d_{i} = \sqrt{\left[\sum_{j=1}^{m} (z_{ij} - z_{pj})^{2}\right]} \qquad (i = 1, ..., n) \qquad (5)$$

where:

 d_i - Euclidean distance from PDP

 $Z_{pj} = Max \{ Z_{ij} \}$ - Positive Development Pattern (PDP)

The advantage of the synthetic ratio, that is the Euclidean distance from PDP, is that the result is a single (synthetic) variable indicating the direction and magnitude of changes in the assessment process, and allowing to objectively measure the phenomenon of innovation.

Regional innovation systems cannot be considered in isolation, and smart specialization should involve an identification of priorities and forms of collaboration between regions⁴. The Smart Specialisation Strategy (S3) in each SEA-EU partner region is based on partnerships between businesses, public entities and knowledge institutions. The next part of this document will be mapping joint fields and analysis of common S3 areas on the regional and national level. After analysis of data selected in Table 4 and 5 for these set of areas, it was necessary to add one more: Tourism and mobility. The analysis is thus made on five areas of description: Maritime and Blue Growth, Health, Energy, Advanced technologies/High-tech/ICT and Tourism/Mobility. The detailed description including policy priorities and innovation dimensions is given below.

Universidad











⁴ Woolford, J., Amanatidou, E., Gerussi, E. and Boden, J.M., Interregional Cooperation and Smart Specialization: a Lagging Regions Perspective, EUR 30499 EN, Publications Office of the European Union, Luxembourg, 2020, ISBN 978 -92-76-27240-3, doi:10.2760/379859, JRC122978

⁽https://publications.jrc.ec.europa.eu/repository/bitstream/JRC122978/jrc report interregional cooperation and la gging regions final pdf.pdf)





2. Maritime and Blue Growth

2.1 Policy priorities

The first area of S3 analyzed from SEA-EU consortium point of view is Maritime and Blue growth. The principles of Smart Specialisation are valuable when implementing Blue Growth – an integrated approach towards stimulating the maritime economy. Both concepts pay considerable attention to innovation, young firm formation, bottom-up approaches and value chains. There were identified several pathways towards building the so-called "Blue Value Nets", notably through:

- 1) Expanding nets through suppliers and enablers;
- 2) Sharing infrastructure;
- 3) Boosting Blue clusters and networks.

All this requires actions from the private sector, by expanding and transforming existing value chains. The public sector can support this process also by:

- a) Enabling competency development and knowledge sharing;
- b) Use of maritime clusters as a tool to promote Smart Specialisation;
- c) Stimulating trans-boundary cooperation and;
- d) Promoting "Collaborative Labs".⁵

The best platform to interpret maritime and Blue Growth is the Blue Economy concept. The EU's Blue Economy encompasses all sectoral and cross-sectoral economic activities related to the oceans, seas and coasts, including those in the EU's outermost regions and landlocked countries. This includes the closest direct and indirect support activities necessary for the sustainable functioning and development of these economic sectors within the single market. It comprises emerging sectors and economic value based on natural capital and non-market goods and services. The "blue economy represents roughly 5.4 million jobs and generates a gross added value of almost 500 billion EUR a year. However, further growth is possible in a number of areas which are highlighted within the strategy⁶.

Blue Growth is a concept which is used by the European Commission (DG MARE) to harness the untapped potential of Europe's oceans seas and costs for jobs and growth. Blue Growth is seen as an innovative way to develop a range of maritime activities that are often dependent on each other, e.g. by relying on common skills and shared infrastructure⁷. In the subsequent implementation of the Blue Growth concept, the

⁶ <u>https://s3platform.jrc.ec.europa.eu/blue-growth2</u>

⁷ EC (2012) Blue Growth – opportunities for marine and maritime sustainable growth. COM(2012) 494 final











⁵ De Vet J-M., Edwards J., Bocci M. (2016), Blue Growth and Smart Specialisation: How to catch maritime growth through 'Value Nets', S3 Policy Brief Series No. 17/2016





importance of innovation across all sectors of the blue economy has been highlighted⁸. The Blue Growth thinking has started from the notion that maritime economic activities cannot be sufficiently captured through a sectoral approach. A total of six broad functions have been distinguished: Maritime transport and shipbuilding, Food, nutrition, health and eco-system services, Energy and raw materials, Leisure, working and living, Coastal protection, and Maritime monitoring and surveillance⁹.

As part of the smart specialisation process, Blue Growth has been recognised as an EU priority, and embraced by over 50 regions. These findings were broadly confirmed by a CPMR study involving 40 different regions in 16 Member States on the new provisions on partnership for 2014 – 2020 Cohesion Policy programmes. It was found however that the involvement of regions varied significantly from one Member State to another. Noticeable is also that Blue Growth is not necessarily referred to as a Priority Axis, but that it is also an important underlying theme within a wide variety of Priority Axes, including those in the areas of Energy, Manufacturing, Tourism, Infrastructure, etc¹⁰.

Blue economy represents a niche of innovation possibilities for many regions across the EU. One out of five EU regions are specialising in at least one domain related to the blue economy. Among those domains we can find: Green shipping and water transport including highways of the seas; blue renewable energy, marine biotechnology. Emerging sectors include marine renewable energy, biotechnology, blue biotechnology, desalinisation, deep-seabed mining, and coastal and environmental protection.

When addressing emerging sectors of the blue economy, an important concern remains in the scarce level of information and/or absence of statistical data, standardised indicators and other tools useful to measure economic and innovation impact. This approach instigates knowledge exchange among several stakeholders eager to conceive more details and data to support and instruct smart, sustainable, socially effective evidence based regional choices. Accordingly, the Smart Specialisation framework helps to spot blue-growth niches of innovation, including its economic activity in blue economy¹¹.

EU established in Blue economy six following sectors: coastal tourism; extraction and commercialization of marine living resources; marine extraction of minerals, oil and gas; ports, warehousing and water projects; shipbuilding and repair; maritime transport. It is close to recent trends in blue economy sectors. New in blue economy ecosystem are emerging sectors such as: blue energy: blue bio-economy; marine minerals;

¹⁰ De Vet J-M., Edwards J., Bocci M. (2016), Blue Growth... p.5
 ¹¹ https://s3platform.jrc.ec.europa.eu/blue-growth2











⁸ EC (2014) Innovation in the Blue Economy: realising the potential of our seas and ocean for jobs and growth. COM(2014) 242 final/2

⁹ Ecorys/Deltares/Océanic Développement (2012) –Blue Growth Study - Scenarios and drivers for Sustainable Growth. Study report on traditional and emerging activities in the blue economy.





desalination; maritime defence¹². In the next part of the document, the Blue economy analysis will be carried out, taking into account members of the SEA-EU consortium and such Blue Growth areas as: Coastal tourism; Marine living resources; Marine non-living resources; Port activities; Shipbuilding and repair and Maritime transport. The selection of the above indicators was dictated by the availability of data necessary to conduct the analysis.

2.2. Socio-economic dimension

In the European Union, over the last 5 years, more than 120 Smart Specialisation Strategies have been designed and implemented by Member States and regions. Financially, these strategies have been supported with more than 67 billion EUR available under the European Regional Development Fund (ERDF) and topped-up by national and regional public and private funding. Smart Specialisation promotes interregional and cross-border partnerships in innovative areas such as renewable energies, industrial modernisation and agrifood supported by the respective Thematic Smart Specialisation Platforms on Energy, Industrial Modernisation and Agri-Food. Expected achievements by 2020 included bringing 15,000 new products and services to the market, creating 140,000 new start-ups and 350,000 new jobs¹³.

The Blue Economy is embedded in the overall EU economy and is therefore highly influenced by the economic cycle. The EU-28 GDP was estimated at 15 900 billion EUR in 2018 (13 500 without the UK) and employment at 224 million people (194 million people without the UK). The contribution of the Blue Economy established sectors to the EU-28 economy in 2018 was 1.5 % in terms of GVA and 2.2% in terms of employment. The relative size of the EU Blue Economy in terms of GVA with respect to the overall economy has remained stable at around 1.5% since 2012, while it has increased in terms of employment from 1.8 % in 2015 to more than 2.2 % in 2018. Although data for the EU Blue Economy established sectors are only available until 2018, given the relative stability in their share over the total economy, it is to be expected that its size continued to expand at similar rates in 2019. According to the Commission Economic Forecast, the euro area economy was projected to contract by a record 7.7 % in 2020 and grow by 6.3 % in 2021. Further, the EU economy was forecast to contract by 7.4 % in 2020 and grow by 6.1 % in 2021. The shock to the EU economy is symmetric in that the pandemic has hit all Member States, but both the drop in output in 2020 (from -4.3% in Poland to -9.7% in Greece) and the strength of the rebound in 2021 are set to differ (Figure 2.3). Each Member State's economic recovery will depend not only on the evolution of the pandemic in the country, but also on the structure of its economy and its capacity to respond with stabilising policies. Given the

¹³ European Commission (2019). The EU Blue Economy Report. 2019... p.116





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¹² European Commission (2019). The EU Blue Economy Report. 2019. Publications Office of the European Union. Luxembourg





interdependence of the EU economies, the dynamics of the recovery in each Member State will also affect the strength of the recovery in other Member States. A comprehensive response at the EU and the national level is being implemented to mitigate the impacts of the crisis and support the recovery.¹⁴.

Analysis of Persons Employed and Gross Value Added (GVA) at Blue Economy SEA-EU consortium¹⁵

Croatia

The Croatian Blue Economy (established sectors) employs 172494 people and generates around €3.6 billion in GVA. The Blue Economy contributes 8.4 % to the national economy in terms of GVA and 10.6 % in terms of jobs. Overall, Blue-based GVA increased 27.8% compared to 2009 due solely to Coastal tourism and Marine living resources. Shipbuilding and repair, Port activities, Marine non-living resources and Maritime transport all saw decreases compared to 2009. Conversely, Blue Economy jobs decreased 4.5% compared to 2009, increasing only in Marine living resources, Coastal tourism and Maritime transport. Marine non-living resources and Shipbuilding have lost a significant amount of jobs compared to 2009 (84% and 40%, respectively). The Blue Economy in Croatia is clearly dominated by Coastal tourism, which contributed with 79% to jobs and 82% of GVA in 2018. Marine living resources and Shipbuilding and repair are also important contributors. Although in decline, the Shipbuilding sector continues to be one of the most important industrial sectors in Croatia. The current Croatian shipbuilding industry is almost negligible in the context of global shipbuilding; however, it has a significant role within the national economy. Production portfolio consists of new buildings of various size(s), repair, conversion and offshore constructions. Currently however, several important shipyards are facing severe financial problems and an uncertain future¹⁶.

France

The French Blue Economy (established sectors) employs around 374689 people and generates over €21.7 billion in GVA. Overall, the percentage of the Blue Economy in terms of GVA has decreased compared to 2009 and in fact, was at its lowest during the period 2015-2018 (contributing a meagre 1 % share). While in absolute terms Blue GVA has been quite volatile over the period analysed, it increased by almost 17.8% compared to 2009. The significant increase in Shipbuilding and repair (+99 %) counterbalanced the 71 % decrease in Port activities compared to 2009. In contrast, national GVA in France has increased over the

¹⁶ European Commission (2020). The EU Blue Economy Report. 2020 Annexes p.18





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¹⁴ European Commission (2020). The EU Blue Economy Report. 2020

¹⁵ Chapter 8, Member State Profiles. European Commission (2019). The EU Blue Economy Report. 2019. Publications Office of the European Union. Luxembourg





entire period but increased by only two percentage points more than the Blue GVA (+19.5% compared to 2009). As for employment, at a national level it remained rather steady over the period of analysis, increasing only 2.6 % compared to 2009, whereas Blue-based employment decreased by 6%. This reduction is largely the result of a 28% decrease in the number of jobs in Port activities and 21% in Marine living resources. The Blue Economy in France is dominated by Coastal tourism, which contributed with 55% of the Blue jobs and 52% of the GVA in 2018. Marine living resources, Port activities and Shipbuilding and repair are also important contributors¹⁷.

Germany

The German Blue Economy (established sectors) provides about 545677 jobs and generates around €29.8 billion in GVA. The national GVA has been on the rise over the whole period, increasing 37% compared to 2009. However, the same cannot be said of Blue GVA, which showed some variability throughout the same period, with its contribution to national GVA at its lowest in 2014-2016. In absolute terms, Blue GVA increased by 19% compared to 2009 while its share towards the national GVA decreased by 13%. On the other hand, the Blue Economy's share of employment has remained relatively steady at around 1.2%. In absolute terms, Blue jobs increased 22% compared to 2009 values, outperforming the national employment, which increased by 7.5 % over the same period; indicating that Blue job's share increased by 13%. According to the data available, Germany's Blue Economy is dominated by Maritime transport, contributing 40% to the overall Blue GVA in 2018. In fact, Germany ranked first in terms of GVA for Maritime transport, generating 33 % of the EU total in 2018. Port activities (23%) and Coastal tourism (18%) are also important contributors. In terms of employment, Coastal tourism produced 37% of all Blue jobs, followed by Maritime transport (24%) and then Port activities (23%). Port activities has grown the most: +66.5% in jobs and +73% in GVA compared to 2009. Germany is split over two sea-basins: the North Sea and the Baltic Sea. The Port of Hamburg is Europe's third busiest port. German ports are important high-tech hubs and also a service provider for the offshore wind power sector. Although data are currently unavailable, Marine renewable energy is a rapidly growing sector in Germany; the second largest producer in the EU. According to BWO,6 the expansion of offshore wind power capacity exceeded that of onshore capacity for the first time in 2019. The industry currently creates a revenue of nearly €9 billion and directly employs 27 000 people, almost half of which work in North Rhine-Westphalia, Baden-Württemberg and Bavaria. The comprehensive value chain (development, construction, operation) creates additional jobs in many businesses¹⁸.

¹⁸ European Commission (2020). The EU Blue Economy Report. 2020 Annexes p.9









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¹⁷ European Commission (2020). The EU Blue Economy Report. 2020 Annexes p.16





Malta

The Maltese Blue Economy (established sectors) employs around 27361 people and generates almost €718 million in GVA. As an island state, it is clearly dominated by Coastal tourism, contributing 89% to Blue Economy jobs and 83% to GVA in 2018. Marine living resources is also a contributor to Blue jobs (7%) and GVA (6%). Although the percentage that the Blue Economy contributes to national GVA grew by 39% compared to 2009, the Blue Economy GVA has increased by 183%, hitting its highest point in 2018 for the reporting period. In addition, Malta's national GVA rose sharply between 2009 and 2018 by 103%. Similar trends are observed in employment where overall, national employment has risen by 48% while Blue jobs increased by 71% compared to 2009.¹⁹

Poland

The Polish Blue Economy (established sectors) employs around 155603 people and generates over €3.2 billion in GVA. It is dominated by Coastal tourism, which contributed 38% to Blue jobs and 29.5% to GVA in 2018. Poland's national GDP growth has been rising by 54%, as has Blue Economy GVA, increasing by 40.1% since 2009. At 0.8% in 2018, the share of Blue Economy GVA to national GDP fell 9 % compared to 2009. While national employment grew by almost 3 %, Blue Economy jobs increased 31.4% compared to 2009. Port activities, Marine living resources and Shipbuilding and repair are also important contributors to the Blue Economy, providing 20%, 24% and 15% of the jobs and 23%, 24% and 18% of the GVA in 2018 respectively. The main ports in Poland are Gdańsk, Gdynia, Szczecin and Świnoujście. Gdansk is a major international transportation hub and Europe's fastest growing port, making plans to double its cargo volumes to 100 million tonnes a year. Gdansk is ideally situated as a gateway port, connecting Nordic countries to central, eastern and southern Europe. Poland also has a considerable fish processing and trade sector, one of the largest in Europe. In fact, the activity 'Processing and preserving of fish, crustaceans and molluscs' contributed to 14% of overall Polish Blue GVA in 2018. It plays a major role in supplying the EU with processed fish products such as smoked salmon and trout, canned herring, mackerel, and sprat, and ready-to-eat fish products like salads and fish marinades. Other products include fresh and frozen cod fillets, ready-to-prepare frozen fish fillets, freshwater and diadromous fish such as pike-perch, as well as fresh and frozen whole fish like trout and sprat. In 2017, Poland exported 445 449 tonnes of fisheries and aquaculture products valued

¹⁹ European Commission (2020). The EU Blue Economy Report. 2020 Annexes p.25

















at over €2 billion; 93 % of which was exported to other EU countries. Around 54 % of production is exported to Germany, with the majority of the remainder destined to the United Kingdom, France, and Denmark²⁰.

Spain

The Spanish established Blue Economy sectors employ around 944 255 people and generates over €32.7 billion in GVA. The Blue Economy has had a positive impact on the Spanish economy and employment rates. In Spain, the share of Blue GVA to the national economy increased by 11% compared to 2009, reaching its highest point in 2018 (3%) and growing at a faster pace than the overall national GVA (+21% compared to 2009 versus +9%). On employment, a similar pattern emerges. The share of Blue Economy jobs to national employment increased by 5% compared to 2009. Although national employment increased by 0.9% compared to 2009, Blue Economy jobs grew 6.4% and were at higher levels by 2018 than in 2009. The Spanish Blue Economy is dominated by Coastal tourism, which contributed 79% to blue jobs and 73.5% to GVA in 2018. The Marine living resources sector is also an important contributor, with 12% of the Blue jobs and 11% of the GVA. Port activities also contribute with 10% to Blue GVA. In fact, in the EU, Spain ranks first in terms of GVA for Coastal tourism and Marine living resources, generating 27% and 17% of the EU total, respectively. Shipping, Marine living resources and Coastal tourism continue to be vital contributors to the Spanish national economy. Spain has the fourth-largest economy in the Eurozone, and the country is the secondmost popular tourist destination in the world. Spain is split over two sea-basins: the North Atlantic and the Mediterranean Sea and is the largest capture fisheries producer in the EU (in landings weight and value)14??. Three of the top ten busiest container ports in the EU are in Spain, all located in the Mediterranean: Port of Valencia (5th), Port of Algeciras (7th) and Port of Barcelona (10th) in 2018. The country receives 80% of its imports and sends out over 50% of its exports through seaports, and has the third-largest fishing fleet in the world, meaning that ports play an important role in national prosperity²¹.

²¹ European Commission (2020). The EU Blue Economy Report. 2020 Annexes p.13











²⁰ European Commission (2020). The EU Blue Economy Report. 2020 Annexes p.29





Table 6. Employment by sector of Blue economy at SEA-EU consortium countries at 2018 (personsemployed in thousands)

							Tatal	
		Marino	Marino				Plue	% of
	Casatal	living			Chinhuilding	Daut	Blue	% UI
	Coastai	living	non-living	waritime	gnippuliaing	Port	economy	national
	tourism	resources	resources	transport	and repair	activities	jobs	employment
Croatia (HR)	136,5	11,9	1,2	7,5	10,6	4,8	172,5	1,60%
France (FR)	206,1	55,8	0,2	32,5	37,7	42,4	374,7	1,40%
Germany (DE)	201,0	48,3	0,3	132,6	39,7	123,8	545,7	1,30%
Malta (MT)	24,3	1,9	0,0	0,3	0,4	0,5	27,4	11,70%
Poland (PL)	58,9	37,6	0,2	3,9	23,8	31,3	155,6	1,00%
Spain (ES)	749,0	117,4	0,1	13,2	24,9	39,7	944,3	4,90%

Source: European Commission (2020). The EU Blue Economy Report. 2020 Annexes

							Total	
		Marine	Marine				Blue	% of
	Coastal	living	non-living	Maritime	Shipbuilding	Port	economy	national
	tourism	resources	resources	transport	and repair	activities	GVA	GVA
Croatia (HR)	714,1	32,0	10,4	48,9	34,6	27,6	868,1	8,40%
France (FR)	170,0	42,0	0,2	20,0	43,5	48,6	324,3	1,00%
Germany (DE)	65,1	30,5	0,3	143,6	38,2	82,6	360,3	1,00%
Malta (MT)	1273,5	91,9	0,0	76,9	19,2	72,6	1534,2	6,60%
Poland (PL)	25,4	20,6	0,2	4,4	15,6	19,9	86,1	0,80%
Spain (ES)	516.7	76.6	0.2	21.0	17.8	70.4	702.6	3.00%

Table 7. Gross Value added per capita of Blue economy at SEA-EU consortium countries at 2018 (EUR)

Source: European Commission (2020). The EU Blue Economy Report. 2020 Annexes

For synthetic analysis two tables were prepared (Table 6 and Table 7). From the analysis of employment in Blue economy the following conclusions can be drawn: in 2018 Spain employed the largest among SEA-EU members number of people in coastal tourism (almost 750 thousand). France and Germany were on second place (with employment around 200 thousand). Very poor result was recorded for Poland (only 58 thousands employees in coastal tourism) as for a country of this size, length of the coastline and access to the sea. Spain





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also employed the highest number of people in marine living resources (117 thousand). In marine non-living resources employment area Croatia was the leader. While in maritime transport the undisputed leader was Germany (132 thousand employees). France had over four times less employees in this area and it was in the second place. In shipbuilding Germany was the first again, but the rest of the members had less varied results. In port activities, Germany were leader again. With regard to total employment in Blue economy, Spain employed 944 thousand people in 2018; Germany (545) and France (374) took accordingly second and third place. Furthermore it is worth noting that considering percentages for the different categories of Tables 6 (% of national employment in Total Blue Economy jobs) Malta has the biggest (11,70%) national employment in Total Blue Economy. Rest of countries has ratio between 1% (Poland) and 1,6% (Croatia). This can illustrate what is the relative level of the ratio considering the size of the country's population but still Malta's 11,70% is quite impressive value among rest of SEA-EU members.

Regarding to Gross Value Added per capita in 2018 in Blue economy sector at coastal tourism Malta figures 1273 EUR per capita and is the leader. Croatia created 714 EUR per capita in coastal tourism. Spain took third place (516 EUR per capita). GVA per capita in marine living resources were less varied. But in Non-living resources Croatia was the leader gaining 10 EUR per capita. Maritime transport gave Germany opportunity to be on the first place (143 EUR per capita). Malta were second, Croatia took third place. In total GVA in Blue Economy Malta, Croatia and Spain were on the podium.

To analyze the competitive position of each SEA-EU country, from Maritime and Blue Growth employment and GVA point of view, a simplified multidimensional comparative analysis was used. Data in Table 6 and Table 7 has been merged and standardized. The Euclidean distances have been worked out for each country using the variable standardization process, the value of the synthetic variable was determined (see Figure 1.) The model consists in determining a positive development pattern, the vector of which consists of the maximum values of the variables for individual objects (SEA-EU consortium countries).















Figure 1. Multivariate synthetic ratio of competitive position in Maritime and Blue Growth sector in 2017 at SEA-EU consortium countries



Source: Own preparation based on data from: European Commission (2020). The EU Blue Economy Report. 2020 Annexes

The interpretation is as follows. The lower the value of the synthetic ratio, the higher the competitive position of the object (SEA-EU country). From Maritime and Blue Growth point of view the highest competitive position is held by Spain (was the closest to positive development pattern). Next in order are: Germany, Croatia and France (both countries may be considered as equal at third place), Malta and Poland.















2.3 Summary assessment

The EU's Blue Economy encompasses all sectoral and cross-sectoral economic activities related to the oceans, seas and coasts, including those in the EU's outermost regions and landlocked countries and fulfills SEA-EU consortium tasks and goals. Blue Economy includes the closest direct and indirect support activities necessary for the sustainable functioning and development of these economic. The Blue Economy is embedded in the overall EU economy and is therefore highly influence by the economic cycle. The EU-28 GDP was estimated at 15 900 billion EUR in 2018 (13 500 without the UK) and employment at 224 million people (194 million people without the UK). The contribution of the Blue Economy established sectors to the EU-28 economy in 2018 was 1.5 % in terms of GVA and 2.2% in terms of employment. Conducted analysis made it possible to select leaders in the Maritime and Blue Growth. From human capital (employees) and possibility of gaining Value Added per capita in the economy perspective there are: Spain, Germany and Croatia and France (ex aequo). It turns out that access to the sea is not a sufficient factor to build a strong competitive position – Poland were the last in ranking. It was not confirmed that strong economies with a larger geographical area have a greater chance of building a strong competitive position in the Blue economy what occurred with Croatia.

















3. Health

3.1 Policy priorities

EU countries hold a primary responsibility to organise and deliver health services and medical care. European Commission health policy therefore serves to complement national policies, and to ensure health protection in all EU policies. EU policies and actions in public health aim to:

- Protect and improve the health of EU citizens;
- Support the modernisation of health infrastructure;
- Improve the efficiency of Europe's health systems.

Strategic health issues are discussed by representatives of national authorities and the European Commission in a senior-level working group on public health. EU institutions, countries, regional and local authorities, and other interest groups contribute to the implementation of the EU's health strategy²². One of the examples of European Commission activity in health area is the operation of Directorate-General for Health and Food Safety.

The Directorate-General for Health and Food Safety of the European Commission's control universe is very broad due to both an extensive body of EU legislation in the Health domains, and the high number of countries involved. Therefore, the Directorate prioritises and plans carefully to ensure it fulfils its obligation for carrying out Commission controls whilst ensuring that it covers the various policy areas in proportion to the risks posed in those areas. The Directorate prepared multi-annual plan 2021-2025. It establishes the selected priority themes and, for each of these, the objectives of controls, including the country coverage for the five-year period. Besides Controls in the Food domain (food and feed safety; animal diseases and plant pests; sustainability of the agri-food chain) Directorate will continue working on the other activities under its responsibility. In particular:

- on the sustainable use of pesticides, the evaluation of the Directive will continue in 2021, as well as the work on the European harmonised risk indicators and integrated pest management. This work will contribute to progress towards the pesticide reduction targets of the Farm to Fork Strategy;
- networking activities with Member States' competent authorities with respect to the multi-annual national control plans and the national audit systems will carry on;

²² https://ec.europa.eu/health/policies/overview_en















- on the Better Training for Safer Food (BTSF) programme, the range of training options and delivery through virtual classes will be further developed;
- it will keep developing and operating the European Commission's rapid alert and notification system for plant pest EUROPHYT-Outbreaks and analysing plant health surveys carried out by Member States²³.

The State of Health in the EU cycle was created in 2016 with a view to developing "expertise on performance assessments of health systems, [...] to build up country-specific and cross-country knowledge which can inform policies at national and European level", including "the work of the European semester of economic policy coordination"²⁴. Public Health topic was divided by European Commission on following areas: Cancer; State of health in the EU; Novel coronavirus 2019; Vaccination; Antimicrobial resistance; Endocrine disruptors - toxicity of chemicals; European Reference Networks; Scientific committees; Law; Policies; Funding and grants; Tenders and contracts. In first eleven items it represents macro perspective of EU in public health domain²⁵. Form Policy point of view it's focuses on 5 big trends in the transformation of health systems:

- 1. Vaccine hesitancy which is a major public health threat all across Europe, which can be tackled by improving health literacy, countering disinformation and actively involving health workers;
- 2. Digital transformation of health promotion and disease prevention which requires targeted oversight and safeguards for its full potential to be harnessed;
- 3. More evidence which is needed to truly capture access to affordable, preventive and curative health care of good quality;
- 4. Skill mix innovations such as task shifting which shows great potential for increasing the resilience of health systems;
- 5. Affordable, innovative and sustainable medicines? Where policymakers struggle to balance accessibility, incentives for pharmaceutical innovation and the fiscal sustainability of health spending.

²⁴ 2014 Mission Letter of President Juncker to Commissioner Andriukaitis

https://ec.europa.eu/commission/commissioners/sites/cwt/files/commissioner mission letters/andriukaitis en.pdf ²⁵ https://ec.europa.eu/info/topics/public-health en











²³ Health and food audits and analysis programme 2021, DG Health and Food Safety, European Union http://ec.europa.eu/dgs/health food-safety/index en.htm





3.2 Socio-economic dimension

Spain

Life expectancy in Spain is the highest in the EU, although many years of life after age 65 are spent with some chronic diseases and disabilities, adding pressure to health and long-term care systems. Preventable and treatable causes of mortality are lower in Spain than in most EU countries, reflecting strong public health policies and the effectiveness of the health care system in treating people with life-threatening conditions. Further progress in reducing mortality from important causes of death such as lung cancer and colorectal cancer could be achieved by reducing risk factors like smoking and increasing screening rates. Obesity rates have increased in Spain, which may hamper progress in further reducing cardiovascular mortality and other obesity-related causes of death. One in six adults was obese in 2017, up from one in eight in 2001. In 2005, the government launched a strategy to improve nutrition, promote physical activity and prevent obesity, followed by new measures in 2011, but the effects so far appear to be modest. Following the economic crisis, health spending decreased for several years, but started to increase again from 2015. In 2017, Spain allocated 8.9% of its GDP to health spending, a lower proportion than the EU average of 9.8%. Budgetary pressures in the coming decades are expected to arise from growing needs for health care and long-term care due to population ageing. While potentially avoidable hospital admissions for some chronic diseases such as diabetes are comparatively low in Spain, they are close to the EU average for others. Regional initiatives have been launched to promote more integrated care for the growing number of people living with chronic conditions. A number of telehealth services have also been implemented in different regions to overcome geographic barriers and promote care continuity. The number of doctors, nurses and other people employed in the national health system has increased over the past few years, but a large number are on temporary contracts, increasing turnover rates. Concerns about shortages of nurses and doctors – particularly of general practitioners – are growing as many approach retirement age. More coherent medical education and training policies have been hampered by the lack of a clear and shared vision between educational and health authorities on needs over the medium and long term. The role of nurses in the provision of some services was expanded in 2018 to increase access to care and improve career prospects for nurses and retention rates. Nurses are now allowed to prescribe some medicines and vaccines included in the official vaccination calendar. Primary care remains a central element of the Spanish health system, with general practitioners and nurses providing care for the whole population, as well as preventive and health promotion services targeting children, women and elderly people. However, growing demands on the primary care system















arising from population ageing may require more and a better use of resources. A new Strategic Framework for Primary and Community Care was adopted in April 2019, including a set of ambitious goals, but the budget to support implementation has not yet been allocated²⁶. One of the challenges in the field of innovations for the future will be to scale up initiatives like: public health policies, reducing mortality, strategy to improve nutrition, promote physical activity, prevent obesity, telehealth services, increasing number of doctors and nurses, increasing access to care and improve career prospects for nurses. The economic foundations for creating innovations coincide with assumptions of S3 like: Health and well-being systems; Fostering the public health and welfare systems through new integrated models of health and well-being management based on e-health and big data exploitation; biotechnology; regenerative medicine; healthy leaving and ageing.

Andalucia as a Spanish region of SEA-EU consortium had a positive influence in the formulation of different regional strategies, plans and programmes where key Smart Specialisation components were adopted. Notably, both Entrepreneurial Discovery Process and the RIS3 governance were integrated in specific development strategies in the fields of ICT, Energy, Bio-economy and Health). Most of them have developed a participatory approach that follows the RIS3 perspective, involved regional actors and stakeholders as part of their governance scheme²⁷. Good example of innovation ecosystem in this region is The Granada Health Technology Park (PTS Granada). It is one of the few technology sites specialized in Health in Europe. It covers an area of 625,000 m², housing its four main areas: Research, Teaching, Patient Care and Business Development. 106 companies and institutions are already up and running in the PTS, employing 5,561 people, 46% of whom are working on R&D activities. The Park has already created more than 1,500 new skilled and highly skilled jobs. The PTS favourable environment is also attracting global companies looking for cuttingedge infrastructure and special support for R&D. Abbott, MSD, Pfizer, Unit 4, Telefónica R&D or Rovi Pharmaceuticals are examples of such success. Whether in the fight against Alzheimer's, the development of new contact lenses to prevent eye diseases, the production of medical kits for detecting ailments, the creation of molecular structures for generating new cell tissues or the development of powerful management systems in bioinformatics, they all have their place in the PTS Granada Park²⁸.

Croatia

Life expectancy in Croatia is increasing, but still lags about three years behind the EU average. One of the reasons for this persistent gap is the low effectiveness of public health interventions. Anti-tobacco policies are underdeveloped, indoor smoking in public places is still widespread, and rates of teenage smoking are

²⁸ <u>https://s3platform.jrc.ec.europa.eu/digital-innovation-hubs-tool/-/dih/3071/view</u>











²⁶ State of Health in the EU, Companion Report 2019, ec.europa.eu/health/state

²⁷ https://s3platform.jrc.ec.europa.eu/-/andalucia-ris3-mid-term-evaluation?inheritRedirect=true





the third highest in the EU. Obesity rates are rising, particularly among children. Preventable mortality is well above the EU average. Croatia spent 6.8% of its GDP on health in 2017, much less than the EU average of 9.8%. Although it is also among the three lowest spenders in the EU in terms of health spending per capita, Croatia has maintained a relatively high share of public spending, resulting in high levels of financial protection. However, levels of public debt still exert constraints on public spending on health. In addition, only around one third of the population is liable to pay health insurance contributions, thereby limiting the revenue base available to the health system. A large share of health expenditure goes to pharmaceuticals, far exceeding the EU average. Policy initiatives to address this include evolving centralised procurement for hospitals, but there is large scope for further action, such as increasing the share of generics. In contrast, a very small share of health expenditure is spent on long-term care, which is generally underdeveloped. In view of the ageing of the population, it will be important to increase the availability of community-based longterm care. There are fewer unmet needs for medical care in Croatia than on average in the EU, yet variations across income groups are substantial, pointing to potential problems in accessibility. In particular, unmet needs due to geographical distance are higher in Croatia than in any other EU Member State; moreover, unmet needs among older people are higher than the EU average. The strategic planning of human resources could be improved. Although the number of doctors and nurses has increased in recent years, they are unevenly distributed across the country, and many are either moving abroad or nearing retirement. Primary care is fragmented and seems to be underutilized compared to inpatient and hospital outpatient care. Long waiting lists for secondary and tertiary care are also a challenge. In 2017, the Ministry of Health introduced a system that provides patients with suspected serious illnesses (such as cancer) accelerated access to specialist care, following referral from their general practitioner. Information available so far indicates that the system has been successfully implemented. There is a lack of data on quality of care and on the effectiveness of health technologies. An Agency for Quality and Accreditation was established in 2007, but it has recently been subsumed under the Ministry of Health and its role has been limited in terms of both quality assurance and accreditation. The information that does exist on quality of care points to substantial scope for health system improvement. The strategic planning and financing of hospitals are key problems, with hospitals routinely accruing substantial debts. While the payment system for hospitals has been reformed, several attempts to rationalize and restructure the sector as a whole have stalled, prompting a new hospital plan for the period 2018-20²⁹. Innovations on areas like: Health and Quality of Life; pharmaceuticals; bio-pharmaceuticals; medical equipment and devices; health services and new methods of preventive medicine and diagnostics; and nutrition fits into S3.

²⁹ State of Health in the EU, Companion Report 2019, ec.europa.eu/health/state














In Croatia production of pharmaceuticals is one of the leading manufacturing sectors in terms of technological sophistication, R&D investments, export orientation and profit. Currently, the pharmaceutical subsector employs around 4,500 people in 37 companies, but when also taking into account the wider supply chain, this number increases to about 10,000 people with overall annual revenue of over 700 mln EUR.Sector is dominated by several large companies, among which Pliva is best known, particularly due to the discovery of the innovative antibiotic azithromycin. Sector's employment level has increased in last five years (2009-2014) for 8% and average yearly investment in R&D has reached 5.5% of the total revenue. Problems with payments collection on the domestic market have further stimulated companies to explore foreign markets and increase their export activities with expected share of export in total revenues reaching 80% in 2015. According to the Association of pharmaceuticals producers, in 2014 around 280 mil EUR worth investments were realized in this sector, mainly in the increase of production capacities and improvement of technology. Production of medical equipment and devices is much smaller, but emerging sector which also shows a good performance in area of health industry. This sub-sector employs around 1400 workers in about 200 companies and generates revenue of around 100 mil EUR annually. One of the good examples of effective collaboration in Croatia is initiative of CC for Health industry that joined the largest pharmaceutical manufacturers (PLIVA Inc., JGL Inc., Pliva Inc.) together with supporting research organizations (Faculty of Medicine, Faculty of pharmacy and biochemistry) to discuss possible establishment of Center of competence dedicated to supporting relevant R&D topics of Croatian pharmaceutical industry³⁰.

Malta

Maltese people enjoy generally good health with one of the longest life expectancies in the EU. Improved health system performance over the last two decades has helped to reduce mortality rates from treatable causes, particularly cardiovascular diseases and some cancers, while public health policies have contributed to low levels of preventable mortality. Further reductions in mortality from cardiovascular diseases have been targeted by increasing timely access to quality acute care. The rising disease burden from diabetes and mental health issues has led to them being recognised as priorities for the health sector. Obesity is a major public health challenge, with adult and childhood obesity rates the highest in the EU. Binge drinking among adolescents also remains a concern. Recent initiatives addressing food provision in schools and alcohol sales to minors aim to tackle these risk factors. Socioeconomic inequalities in health status and related risk factors persist and tackling health inequalities and their causes is a new cross-sectoral political focus. Malta spent 9.3% of GDP on health care in 2017, which is slightly below the EU average (9.8%). Reorienting services away

³⁰CROATIAN SMART SPECIALISATION STRATEGY 2016-2020 https://s3platformlegacy.jrc.ec.europa.eu/documents/20182/222782/strategy_EN.pdf/e0e7a3d7-a3b9-4240-a651-a3f6bfaaf10e















from hospital settings towards primary and outpatient care to improve efficiency and enhance care for chronic conditions is a priority. Primary care is being strengthened through upskilling the workforce, building new facilities and upgrading existing ones, and expanding the range of services. A reorientation of services to more cost-effective settings will help accommodate future projected increases in spending due to an ageing population. Reported unmet needs for medical care in Malta are generally low, but some evidence points to a higher impact on lower income groups. A comprehensive benefit package is available free of charge; however, out-of-pocket spending is among the highest in the EU, due to private expenditure on primary and outpatient care. This is partly due to attempts to bypass long waiting lists for specialist services and a large proportion of the population being required to pay out of pocket for some pharmaceuticals prescribed in these settings. While efforts to reduce waiting lists for inpatient care have been largely successful, waiting lists for outpatient services are growing. Reforms to education, training and working conditions for health professionals have successfully increased the number of physicians and nurses working in Malta. An increasing reliance on migrant nurses in acute and longterm care, and an ageing private general practitioner workforce may pose future workforce challenges. As a small country, Malta faces difficulties in ensuring availability of new medicines. This is now a critical issue, with the government's list of approved medicines struggling to keep up with innovation. The increased use of Managed Entry Agreements, biosimilars and clinical pathways, and protocols for the evaluation of new medicines has contributed to improved access in recent years. For innovation creation stronger cross-border collaboration and policy options facilitating the use of generics and bio-similars, as well as new models encouraging joint procurement and price transparency, are key strategies to further enhance access to medicines. Furthermore new public capital investment has been made to upgrade medical equipment in hospitals and to build additional hospital units to improve capacity for outpatient services, mental health care and mother and child care. A new publicprivate partnership aims to secure further capital investment to modernise hospitals and improve capacity, but careful monitoring is needed to ensure it improves quality of care, while maintaining equitable access and safeguarding health system sustainability^{31 32}.

The Pharmaceutical Sector is the most highly developed sector within the overall life sciences area in Malta. It has been focused on production of generic pharmaceuticals, with exports exceeding 288 mln EUR in 2017. It is greatly enhanced by the fact that Malta is a European Union reference state which means that any appropriately certified operator may market its products throughout the European Union. Furthermore, legislation allows for the early development, testing and stockpiling of product which ensures that a generic product can be first to the market upon expiration of the patent held by a branded manufacturer. Malta's

https://www.euro.who.int/ data/assets/pdf file/0005/419468/Country-Health-Profile-2019-Malta.pdf











³¹ State of Health in the EU, Companion Report 2019, ec.europa.eu/health/state

³² State of Health in the EU · Malta · Country Health Profile 2019





pharmaceuticals industry in 2018 was the host to a number of reputable operators primarily engaged in the production of active ingredients; solid dosage formulations and capsules; as well as batch release, testing and validation³³.

France

Life expectancy in France remains one of the highest in the EU, but progress has slowed in recent years and there remain large disparities by socioeconomic status. As in other EU countries, many years of life after age 65 are spent with some chronic diseases and disabilities. Public health and prevention policies have traditionally been neglected in France. As part of the National Health Strategy 2018-22, the government has allocated EUR 400 million over five years to support prevention programmes across all ages. Some policies have already had a positive impact in reducing important risk factors: smoking rates and alcohol consumption have fallen over the past decade, yet remain above the EU average. To improve nutrition and reduce obesity, a 'nutri-score' food label was developed in 2017 to help people make healthier choices. In response to falling vaccination rates among children, the government made a further eight vaccinations mandatory in 2018 (for a total of 11 mandatory vaccinations). Public awareness campaigns were also launched to restore public trust in the benefits of vaccination. Preliminary evidence suggests that these measures have successfully led to an increase in childhood vaccination rates. In 2017, France spent more than 11% of its GDP on health, the highest share among EU countries along with Germany. On a per capita basis, health spending in France was the sixth highest in the EU. Public insurance schemes funded 78% of all health spending, while private compulsory insurance covered another 5%. Unmet needs for medical care are generally low, but they are higher for services less covered by public insurance, such as optical and hearing aids and dental care. There are concerns about growing shortages of doctors, as 45% of all doctors are aged 55 and over. In response, the number of students admitted to medical schools has been increased and will be increased further by 20% by 2020. Medically underserved areas ('medical deserts') are a concern in France. Up to 8% of the population live in areas where access to doctors is potentially limited, mainly in rural and deprived areas. A series of measures has been taken over the past decade to promote the recruitment and retention of doctors in underserved areas, including financial incentives for doctors to set up their practice in these areas and the creation of multidisciplinary medical homes, which the government wants to double between 2017 and 2022. Nurses and pharmacists are now allowed to administer flu vaccinations to older people and other at-risk groups, nurses can play a greater role in the management of chronic diseases such as diabetes, and a new medical assistant role to reduce general practitioners' administrative workload has been introduced. Since 2016, the

³³ The life science sector in Malta – An overview, Invest in Malta;

https://maltaenterprise.com/sites/default/files/The%20Life%20Sciences%20Sector%20in%20Malta.pdf















government has been providing support to expand inter-professional networks, which aim to strengthen coordination between primary care providers and specialists and to improve care for the growing number of people living with chronic conditions. The goal is to multiply by five the number of these local networks by 2022^{34 35}.

Germany

Life expectancy in Germany is around the EU average but lower than most Western European countries. This is mainly due to comparatively high mortality rates from causes of death that could be avoided through more effective public health and prevention policies. Although smoking and alcohol consumption rates have decreased they are still above the EU average, and the number of overweight and obese adults is rising. The German health system provides almost universal health coverage with a broad social health insurance benefit basket, and access to services is good. Few people report foregoing care for financial reasons, waiting times or distance, and the gaps between socioeconomic groups are relatively small. The low share of out-of pocket payments in health financing contributes to strong financial protection and catastrophic health expenditure levels are lower than in most other European countries. Recent legislation aimed to close remaining coverage gaps, for instance by reducing minimum contributions for self-employed people on low incomes and simplifying coverage for migrants. The number of doctors and nurses is higher than in many other EU countries and is increasing. However, there is currently a shortage of skilled health workers, especially in rural and remote regions. The expansion of publicly funded long-term care benefits is also increasing the demand for nurses. Germany has sought to counteract a potential health workforce shortage, by making the nursing profession more attractive and providing incentives to young doctors to open a practice in rural areas. However, skill mix innovations, which extend the tasks of nurses to relieve general practitioners, have not yet been implemented nationwide. Utilisation of both inpatient and outpatient care in Germany is substantial and leads to oversupply, particularly in some urban areas. The large number of services provided in an inpatient setting raises some doubts as to the appropriateness of these utilization patterns. Germany still has the highest ratio of hospital beds per population in the EU and hospital discharge rates have increased significantly in recent years (partly reflecting population ageing). Services are provided in many small and often inadequately equipped hospitals, resulting in lower quality. Policymakers are aware of this problem and reforms are under discussion to promote the centralisation and specialisation of hospitals. The German health system is moderately effective, but more expensive than most other EU countries. It is effective in avoiding mortality from treatable causes and provides substantial human and infrastructural resources,

³⁵ State of Health in the EU · France · Country Health Profile 2019 <u>https://www.oecd-ilibrary.org</u>











³⁴ State of Health in the EU, Companion Report 2019, ec.europa.eu/health/state





which translate into the second highest health expenditure as a share of GDP in the EU, after France. However, the costs of Germany's health system do not match the often average health outcomes of the population, leaving room for further efficiency gains. The German health system is complex, with shared responsibilities between different levels of government and self-governing bodies of payers and providers. Delegation of responsibilities to bodies of self-governance assures well informed decisions, but also contributes to the fragmented structure of the system with its plurality of payers and providers. There is no systematic and integrated evaluation across different health care sectors or regular performance assessment to better understand processes and outcomes. Overcoming this obstacle would increase the scope for health system improvements and possibly reduce expenditures^{36 37}.

Poland

Since 2000, life expectancy at birth has increased by four years in Poland, but remains three years below the EU average. Inequalities in life expectancy by gender and education are marked: men with the lowest level of education live about 12 years less than the most educated. Life expectancy at age 65 has also increased, yet two thirds of older people live with at least one chronic disease and almost half live with depressive symptoms. Behavioural risk factors account for almost half of all deaths. While smoking rates have decreased, and lung cancer deaths have fallen, they are higher than the EU average and much greater for men than for women. Obesity rates have also increased over the last ten years for adults and particularly for children, although both are still below the EU averages. Unhealthy dietary behaviours and low physical activity contribute to this growing public health issue, which has been largely neglected so far. Mortality from treatable causes continues to be much higher than the EU average and survival rates for cancers are consistently lower than in the EU, indicating that there is much scope for improvement in early diagnosis and timely, effective treatment. Total health spending per capita (EUR 1507) and as a share of GDP (6.5%) is among the lowest in the EU. A recent pledge to increase public spending on health from 4.6% of GDP in recent years to 6.0% of GDP by 2024 acknowledges this underfunding issue. The injection of extra funds, if invested effectively, could go a long way in addressing the main barriers to accessing care. This would comprise tackling long waiting times for medical services, and shoring up capacity to meet population needs, particularly in underserved areas. Lack of affordability also hinders equity of access to health care. Out-ofpocket spending is comparatively high, at nearly 23% of health expenditure. Most of it is due to limited public coverage for outpatient pharmaceuticals, the largest single driver of catastrophic health spending, which affected some 30% of low-income households in 2014. Despite a surge in medical graduates over the last

³⁷ State of Health in the EU · Germany · Country Health Profile 2019 <u>https://www.oecd-ilibrary.org</u>











³⁶ State of Health in the EU, Companion Report 2019, ec.europa.eu/health/state





decade, shortages of health professionals in public facilities, particularly doctors and nurses, are among the most acute in Europe. Since training health professionals may take time, human resources planning requires urgent action, along with attention to recruitment and retention policies. In particular, shortages of general practitioners will continue to pose a major challenge for the effective delivery of primary care. The avoidable hospitalisation rate for chronic conditions that could be treated in outpatient settings is one of the highest in Europe, reflecting issues in access to and quality of primary care. Related to this, the provision of care continues to be over-reliant on hospitals and the shift to more community-based care has not yet materialised. Health care governance is fragmented and helps explain the slow progress with reforms, such as reducing the number of hospital beds and clearing hospital debts^{38 39}.

3.3 Summary assessment

In the Health area the following aspects were identified for the SEA-EU consortium partner countries: medical technologies in the area of civilization and ageing-associated diseases; modern solutions in prevention, diagnosis and therapy of civilisation diseases and ageing period; support systems for people with disabilities; life sciences; medical technology/surgery technology; pharmaceuticals; biotechnology; diagnostics; therapies; imaging; laboratory equipment and implantology; health and wellbeing; better quality of life (a) Prevention – health - wellbeing, b) New therapeutic approaches combining genetics, biomarkers and biomolecules, c) Medical, diagnostic and therapeutic technologies and e-health; ICT in health; health with a focus on healthy living and active ageing; e-health; bio-pharmaceuticals, medical equipment and devices; health services and new methods of preventive medicine and diagnostics; health and well-being systems; Fostering the public health and welfare systems through new integrated models of health and well-being management based on e-health and big data exploitation; regenerative medicine. As an innovation potential all those aspects mentioned above can be implemented through challenges for example in timely access to medical services (see Table 8.).

³⁹ State of Health in the EU · Poland · Country Health Profile 2019 <u>https://www.oecd-ilibrary.org</u>











³⁸ State of Health in the EU, Companion Report 2019, ec.europa.eu/health/state





Table 8. Challenges in timely access to adapted services

	Spain	Croatia	Malta	France	Germany	Poland
Palliative care	x		х			
Older people			х			х
Dementia patients					х	
Patients with mental illness			х		х	х
Physically disabled people				х	х	

Source: Adapted from European Observatory on Health Systems and Policies (2019), Gaps in coverage and access in the European Union (based on the individual assessments of country correspondents).

According to European Observatory on Health Systems and Policies from 2019 – the document identifying gaps in coverage and access in the European Union (based on the individual assessments of country correspondents)⁴⁰ Croatia have been evaluated as a country where there is no challenges in: Palliative care, Older people, Dementia patients, Patients with mental illness and Physically disabled people. In Spain innovations resolving problems in timely access to palliative care can be implemented. In France focus can be directed to physically disabled people. Malta and Germany have three challenges to resolve. Poland can improve timely access to adapted services for older people and patients with mental illness.

Table 9. Services in Health frequently excluded from regular coverage

	Spain	Croatia	Malta	France	Germany	Poland
Optical treatments	х			х		
Dental care for adults						
Orthodontic care and dental implants	х			х		
Physiotherapy						
Mental care				х		х
Experimental new pharmaceuticals		х	х			х

Note: (*) This category covers experimental or very expensive new pharmaceuticals that are not systematically covered or delayed in terms of their inclusion in the benefit package. It affects especially cancer patients in Austria, Czechia, Estonia, Hungary, Latvia and Slovakia, whereas it affects especially patients with rare diseases in Austria, Estonia, Croatia, Latvia, Poland, Malta and the Netherlands.

⁴⁰ European Observatory on Health Systems and Policies (2019), Gaps in coverage and access in the European Union















Source: Adapted from European Observatory on Health Systems and Policies (2019), Gaps in coverage and access in the European Union (based on the individual assessments of country correspondents).

The situation is different in the case of Services in Health frequently excluded from regular coverage (see Table 9). Germany does not excluded services like: optical treatments; dental care for adults; orthodontic care and dental implants; physiotherapy; mental care or access to experimental new pharmaceuticals. Croatia and Malta only exclude one service . Spain and Poland do not cover two services (Spain: optical treatments and orthodontic care and dental implants; Poland: mental care and experimental new pharmaceuticals). The country which fares the worst in this matter is France, where three services are excluded.

Some products or services created in SEA-EU consortium in health may be dedicated to prevent against disease. Disease prevention is commonly defined as having three dimensions, including primary (promoting good health and intervening before diseases ensue, e.g. vaccination campaigns), secondary (screening efforts to detect diseases in the earliest stages before onset of signs and symptoms, e.g. mammography) and tertiary (managing disease after diagnosis to slow or stop disease progression, e.g. rehabilitation, chemotherapy)⁴¹. Figure 2 summarises the share of total health spending dedicated to prevention in each SEA-EU consortium country, which is equal 3% on EU's average to Germany, above average for Croatia and below average for France, Poland, Spain and Malta.



Figure 2. Percentage spending devoted to prevention in Health System in 2019 across the SEA-EU consortium

Source: Adapted from OECD/European Observatory on Health Systems and Policies (2019), Country Health Profiles 2019, State of Health in the EU (data refer to 2017)

⁴¹ State of Health in the EU, Companion Report 2019, ec.europa.eu/health/state

















Figure 3. Seeking health information online varies strongly by education in SEA-EU consortium countries (in %)

Source: Eurostat database. Note: the indicator captures the seeking of health information among individuals who used the internet in the last three months of 2019. Data presented in State of Health in the EU, Companion Report 2019

Counteracting the digital divide may be one of the priorities in the area of e-Health. Even among individuals who are active internet users, socioeconomic gaps in seeking health information online persist. Figure 3 illustrates a similar digital divide among internet users by education level, using the latest data from the 2019 Digital Economy and Society Index (DESI) report⁴². For SEA-EU consortium countries there was a clear disproportion in the area of seeking health information online with Individuals with high formal education between Malta (85%) and France (only 62%). With Individuals with medium formal education situation is similar (Malta 75% and France 49%). It is worth noticing two results, first that in Croatia, individuals with medium and low formal education seek health information on the same level (64%) and second that Poland and France have the lowest result in the group of Individuals with no or low formal education (accordingly 46% and 41%). These relatively low figures can serve as a stimulus for these countries to develop IT tools against e-Health exclusion.

⁴² State of Health in the EU, Companion Report 2019, ec.europa.eu/health/state















Member State	Total health care expendit ure (EUR) per capita	Long-term care (health) expenditure (EUR) per capita	Practising physicians Per 100 000 inhabitants	Hospital beds Per 100 000 inhabitants	Healthy life years at birth (years)	Life expectancy at birth (years)	Share of people with good or very good perceived health (% of population aged 16 or over)	Employm ent in pharmace utical industry	Pharmac eutical market value (EUR) per capita	Pharmac eutical imports (EUR) per capita
Croatia (HR)	853,29	25,66	344	561	57,5	74,9	60,5	5220	202,18	253,76
France (FR)	3971,32	618,21	317	590	63,9	79,7	66,7	98528	431,82	369,01
Germany (DE)	4641,30	862,75	431	801	65,8	78,6	65,5	119535	466,15	576,74
Malta (MT)	2369,66	461,53	397	430	72,7	80,4	74,2	1057	164,53	391,02
Poland (PL)	829,52	51,270	238	653	62,4	73,7	59,9	29873	180,11	160,71
Spain (ES)	2320,27	221,16	402	297	68	80,7	73,7	42653	351,44	283,08

Table 10. Health sector ratios at SEA-EU consortium countries in 2018

Source: Own preparation based on:

https://ec.europa.eu/eurostat/databrowser/view/tps00207/default/table?lang=en pharmaceutical-industry-in-figures-2019.pdf

https://www.efpia.eu/media/412931/the-

To analyze the competitive position of each SEA-EU country, from the health sector point of view, a simplified multidimensional comparative analysis was used. Using the variable standardization process, the value of the synthetic variable was determined (see Figure 4.). The model used the variables presented in Table 10. Methodology is the same as in previous (Figure 1.) multivariate synthetic ratio calculation. The model consists in determining a positive development pattern, the vector of which consists of the maximum values of the variables for individual objects (SEA-EU consortium countries). The lower the value of the synthetic ratio, the higher the competitive position of the object - SEA-EU country (positive development pattern has value equals 0). The multidimensional ranking of the competitive position based on 2018 of the SEA-EU consortium from health point of view is as follows (from the country with the best competitive position to the weakest): Germany (the leader), France, Malta, Spain, Croatia and Poland.















Figure 4. Multivariate synthetic ratio of competitive position in health sector at SEA-EU consortium countries in 2018



Source: Own calculation based on data from: <u>https://ec.europa.eu/eurostat/databrowser/view/tps00207/default/table?lang=en;</u> https://www.efpia.eu/media/412931/the-pharmaceutical-industry-in-figures-2019.pdf

As a result of Euclidean distance measure two clusters occurred (see. Figure 4.). Malta and Spain took ex aequo third place. While Croatia and Poland took ex aequo fourth place in SEA-EU health sectors ranking. Moreover the distance between Germany and fourth place countries is over three and a half times. It shows how far away from Germany are Polish and Croatian health sector economies from: Total health care expenditure (EUR) per capita; Long-term care (health) expenditure (EUR) per capita; Practising physicians Per 100 000 inhabitants; Hospital beds Per 100 000 inhabitants; Healthy life years at birth (years); Life expectancy at birth (years); Share of people with good or very good perceived health(% of population aged 16 or over); Employment in pharmaceutical industry; Pharmaceutical market value (EUR) per capita; Pharmaceutical imports (EUR) per capita point of view.















4. Energy

4.1 Policy priorities

Economic efficiency, social inclusion and environmental responsibility is essential for sustainable development. Since the adoption of the 2030 Agenda for Sustainable Development in 2015, the European Union has made significant progress towards delivering the Sustainable Development Goals and continues to do so. The EU is fully committed to implementing the 2030 Agenda, and has embarked on a transition towards a low-carbon, climate-neutral, resource-efficient and circular economy. The EU's 2030 Climate and Energy Framework sets out the objectives of: a 40 % cut in greenhouse gas emissions; a 32 % share of energy from renewable sources; and a 32.5 % improvement in energy efficiency, compared to 1990 levels. The aim of the EU's 'Energy Union' is to diversify Europe's energy sources and ensure energy security, create a fullyintegrated internal energy market, improve energy efficiency, cut emissions and support research and innovation in low-carbon and clean energy technologies. The European Commission's 'Roadmap to a Single European Transport Area', contains 40 concrete initiatives to build a competitive transport system that will increase mobility, remove major barriers in key areas and fuel growth and employment. Furthermore, the strategy will dramatically reduce Europe's dependence on imported oil and cut carbon emissions in transport by 60% by 2050. The Commission's 7th Environment Action Programme guides European environment policy towards 2020. It aims to protect, conserve and enhance the EU's natural capital, transform the EU into a resource-efficient, green and competitive low-carbon economy, and safeguard the EU's citizens from environment-related pressures. The 2015 Circular Economy Action Plan has accelerated the transition towards a circular economy in Europe, creating new jobs and business opportunities, giving rise to new business models and developing new markets. The European Union's energy policy includes the need for secure energy supplies, sustainable energy consumption, lower fossil fuel dependence and improvements in energy efficiency. The European Energy Strategy and Energy Union need to be underpinned by statistical evidence for sound decision making. To this end, energy statistics is one of the key inputs for monitoring progress towards the existing targets and goals (Europe 2020 and Europe 2030) and developing new energy policies. As energy is vital to many sectors of the economy, energy data contribute also to explaining developments in other areas such as transport and climate change⁴³.

Among the sea consortium countries, the most diversified area of energy production is in Germany (see Table 11.). Not taking into account "natural gas" and "crude oil", Spain came second in this area. France, Croatia and Malta do not produce energy from Solid fossil fuels, whereas Malta has 100% renewable energy production. Noteworthy is also the fact that in Croatia, Malta and Poland there is no nuclear energy produced.

⁴³ Energy, transport and environment statistics 2019 edition, Statistical Books, Eurostat















	Total produc of primary e	tion nergy	Share of to	tal productio	n, 2018					
	2008	2018	Nuclear energy	Solid fossil fuels	Natural gas	Crude oil	Renewable energy	Other		
	(million tonnes of oil equivalent)		%	%						
EU-28	698,8	634,8	30,8	18,3	9,3	3,4	34,2	3,9		
Germany	136,3	112,9	17,3	33,5	4,2	1,9	38,1	5.0		
Spain	30,2	34,6	41,8	2,5	0,2	0,3	54,2	0,9		
France	135,9	137,9	78,0	0.0	0.0	0,6	20,0	1,4		
Croatia	4,8	4,2	0.0	0.0	24,3	16,7	57,0	2,0		
Malta	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0		
Poland	70,7	61,4	0.0	76,5	5,6	1,7	14,5	1,7		

Table 11. Energy production of SEA-EU consortium partners, 2008-2018

Note: Category 'other' includes natural gas liquids, additives and oxygenates (excluding biofuel portion), other hydrocarbons, peat, oil shale and oil sands, industrial waste (non-renewable) and non-renewable municipal waste.

Source: Eurostat online data; based on Eurostat Energy, transport and environment statistics 2020 https://ec.europa.eu/eurostat/documents/3217494/11478276/KS-DK-20-001-EN-N.pdf/06ddaf8d-1745-76b5-838e-013524781340?t=1605526083000

Energy is a topic with high interest amongst the EU Member States and regions implemented Smart Specialization Strategy (S3PEnergy). The S3PEnergy promotes activities for achieving a shared vision on knowledge-based energy policy, accompanying European territories in the implementation of energy-related innovation strategies. The goal of the S3PEnergy is to set up a collaborative framework which will accelerate the development and deployment of innovative low carbon technologies in the EU in the framework of Smart Specialisation. The S3PEnergy collaborates with interested EU regions and countries to: analyse current energy priorities and policies; identify common challenges and possible solutions; prepare thematic papers and workshops; carry out active outreach activities to build and disseminate knowledge on the possibilities for investing in energy projects from the Cohesion Policy funds; support bottom-up transregional cooperation and the creation of EU-wide ecosystems for R&I in energy. As a result of this support to inter-territorial cooperation, the S3PEnergy has facilitated the creation of interregional partnerships between those EU regions and Member States that have identified renewable energy technologies and innovative energy















solutions as their smart specialisation priorities. Through these partnerships the S3PEnergy had promoted the alignment of local, regional, national and European activities on energy sustainability, competitiveness and security of supply. Interregional collaboration helps Member States and regions to combine complementary strengths and research capacities, align R&I efforts and agendas in the context of S3, overcome the lack of critical mass and fragmentation, gain better access to the global value chains and foster co-investment in new growth areas across the EU. So far, six partnerships have been created, with the ultimate goal to establish European ecosystems for interregional collaboration in regions and countries that share similar energy priorities in their S3: Bioenergy; Geothermal; Marine RE; Smart Grids; Solar; Sustainable Buildings⁴⁴.

4.2 Socio-economic dimension

The EU seeks to have a 20 % share of its gross final energy consumption from renewable sources by 2020; this target is distributed between the EU Member States with national action plans designed to plot a pathway for the development of renewable energies in each of the Member States⁴⁵. Table 11 shows the latest data available for the share of energy from renewable sources in gross final consumption of energy. The highest value of this indicator was recorded for France (6,4%) then Poland (3,7%) and Spain (2,5%) compared to 1,1% for EU27 value of the ratio. It is worth noting that Croatia recorded an 8% decrease in the indicator value.

The general downward development of EU primary energy production may, at least in part, be attributed to supplies of raw materials becoming exhausted and/or producers considering the exploitation of limited resources uneconomical⁴⁶. Primary energy production in the EU in 2018 was spread across a range of different energy sources, the most important of which in terms of the size of its contribution were the renewable energy sources, with more than one third (34,2 %) of the EU's total production. Nuclear energy was second, with 30,8 % of the total primary energy production. The significance of nuclear energy was particularly high in France where it accounted for 78,0 % of the national production of primary energy. In 2018, the highest level of Electricity generation from nuclear plants indicator was observed for France (35,5 million tonnes of oil equivalent). It is over half of EU27 ratio value. For Croatia, Malta and Poland there were no observations in this matter.

⁴⁵ Eurostat online data; based on Eurostat Energy, transport and environment statistics 2020

https://ec.europa.eu/eurostat/documents/3217494/11478276/KS-DK-20-001-EN-N.pdf/06ddaf8d-1745-76b5-838e-013524781340?t=1605526083000

⁴⁶ Eurostat online data; based on Eurostat Energy, transport and ...











⁴⁴ <u>https://s3platform.jrc.ec.europa.eu/s3p-energy</u>





Table 12. Main Energy indicators for SEA-EU consortium countries

Indicator	Year	EU27	Germany	Spain	France	Croatia	Malta	Poland
Share of energy from renewable sources in gross final consumption of energy	2018 (difference to 2020 target (%))	1,1	1,5	2,5	6,4	-8,0	2,0	3,7
Electricity generation from nuclear plants	2018 (million tonnes of oil equivalent)	65,5	6,5	4,8	35,5	0,0	0,0	0,0
Electricity prices for household consumers (1)	2019 S2 (EUR/kWh)	0,22	0,29	0,24	0,19	0,13	0,13	0,14
Natural gas prices for household consumers (²)	2019 S2 (EUR/kWh)	0,07	0,06	0,10	0,08	0,04	-	0,05
Energy dependency on oil and petroleum products (excluding biofuels)	2018 (net imports/gross available energy (%))	94,6	95,5	99,0	97,7	82,1	97,4	98,7
Gross electricity generation from renewable sources	2018 (share of gross electricity consumption (%))	32,2	38,0	35,2	21,2	48,1	7,7	13,0
Energy dependency on natural gas imports/gross available energy (%))		83,2	95,9	101,4	104,7	53,3	109,5	77,6
Energy from renewable sources used in transport	2018 (share of gross final energy consumption (%))	8,3	7,9	6,9	9,0	3,9	8,0	5,6
Primary production of renewables and biofuels	2018 (million tonnes of oil equivalent)	217,3	43,0	18,8	27,6	2,4	0,0	8,9

(1) For households with annual consumption between 2 500 kWh and 5 000 kWh; prices include VAT and other taxes and levies; data for the 2nd semester of 2019.

(2) For households with annual consumption between 5 555 kWh and 55 555 kWh (20 - 200 GJ); prices include VAT and other taxes and levies; data for the 2nd semester of 2019

Source: Eurostat online data; based on Eurostat Energy, transport and environment statistics 2020 https://ec.europa.eu/eurostat/documents/3217494/11478276/KS-DK-20-001-EN-N.pdf/06ddaf8d-1745-76b5-838e-013524781340?t=1605526083000

Gross inland energy consumption in the EU in 2018 was 1 479 mtoe, 0,8 % lower than in 2017. It was relatively stable during the period 1990-2010, with a strong decrease in 2009, mostly as a result of the financial and economic crisis. The biggest share in the structure of final energy consumption in 2018 was for oil and petroleum products (36,7 %), followed by electricity (23,0 %) and natural gas (21,4 %). Solid fossil fuels contributed only 2,4 % to the final energy consumption at the end-use level. An analysis of the final end use of energy in the EU in 2018 shows three dominant categories: transport (30,5 %), households (26,1 %)















and industry (25,8 %). The price of energy in the EU depends on a range of different supply and demand conditions, including the geopolitical situation, the national energy mix, import diversification, network costs, environmental protection costs, weather conditions, or levels of excise and taxation. Note that prices presented here include taxes, levies and VAT for household consumers, but exclude refundable taxes and levies for non-household consumers. For household consumers, (defined here as medium-sized consumers with an annual consumption between 2 500 kWh and 5 000 kWh), electricity prices in the second half of 2019 were highest among the SEA-EU consortium States in Germany (0,29 EUR/KWh). The lowest in Croatia and Malta (equally 0,13 EUR/KWh). The EU average price in the second semester of 2019 — a weighted average using the most recent (2018) data for electricity consumption by household consumers — was EUR 0.22 per kWh⁴⁷.

The average price in the EU27 — a weighted average using the most recent (2018) data for natural gas consumption by household consumers — was EUR 0.0720 per kWh. The highest natural gas prices for household consumers with annual consumption between 5 555 kWh and 55 555 kWh (20 - 200 GJ) was observed for Spain (0,10 EUR/KWh) the lowest for Croatia (0,04). For Malta there were no values of the indicator caused by no consumption of this energy source⁴⁸.

The decrease of primary energy production in the EU over the past decades resulted in increased imports of primary energy and energy products. The long trend since 1990, when import dependency was 50.1 %, shows increased import dependency. EU dependency on energy imports did not change much over the last decade, from 58.4 % of gross available energy in 2008 to 58.2 % in 2018. Between 2008 and 2018, few variations were noticed on the energy dependency rate: a maximum of 58.4 % was registered in 2008, while 53.9 % was the lowest dependency registered in 2013. Looking in more detail, the highest rates in 2018 were recorded for crude oil (94.6 %) and for natural gas (83.2 %), while the latest rate available for solid fossil fuels was 43.6 %. Between 2008 and 2018, the EU's dependency on non-member countries for supplies of natural gas grew by 13.1 percentage points, much faster than the growth in dependency for solid fossil fuels (up 2.1 percentage points). The dependency for crude oil during the same period remained constant⁴⁹. The highest ratio of Energy dependency on oil and petroleum products (excluding biofuels) for SEA-EU consortium countries was rated for Spain (99%) and Poland (98,7%). The lowest for Croatia (82,1%). Germany energy dependency ratio (95,5%) was closest to EU27 level (94,6%).

The EU seeks to have a 20% share of its gross final energy consumption from renewable sources by 2020; this target is distributed between the EU Member States with national action plans designed to plot a pathway for the development of renewable energies in each of the Member States. The accounting rules in

²⁵ Eurostat online data; based on Eurostat Energy, transport and ... p.13











⁴⁷ Eurostat online data; based on Eurostat Energy, transport and ... p.29

⁴⁸ Eurostat online data; based on Eurostat Energy, transport and ... p.29

⁴⁹ Eurostat online data; based on Eurostat Energy, transport and ... p.13





Directive 2009/28/EC prescribe that electricity generated by hydro power and wind power have to be normalised to account for annual weather variations (hydro has been normalised over the last 15 years and wind over the last 5 years). The growth in electricity generated from renewable energy sources during the period

2008 to 2018 largely reflects an expansion in three renewable energy sources across the EU, principally wind power, but also solar power and solid biofuels (including renewable wastes). In 2018 wind power is the single largest source for renewable electricity generation in the EU. Indeed, the amount of electricity generated from hydro was relatively similar to the level recorded a decade earlier. By contrast, the amount of electricity generated in the EU from solar and from wind turbines was 15,5 times and 2,9 times as high in 2018 as it had been in 2008. The growth in electricity from solar power has been dramatic, rising from just 7.4 TWh in 2008 to 115.0 TWh in 2018. There is a significant variation between SEA-EU consortium countries: in Croatia almost half of all the electricity consumed was generated from renewable energy sources (48,1%). On the other hand, in Malta it is only 7,7%. Germany and Spain noted value of the ratio close do EU-27 level.⁵⁰

Russia's share of EU imports of natural gas between 2008 and 2018 increased slightly (40.4 %). Nevertheless, the lowest level was recorded in 2010 (35.2 %) and the peak of 45.3 % was recorded in 2013. Norway remained the second largest supplier of EU imports of natural gas, its share slowly falling from 22.0 % in 2008 to 18.1 % in 2018. The share of EU natural gas supplies that originated from Algeria, the third largest supplier, declined between 2008 and 2018, whereas the share from Qatar almost doubled.⁵¹ For Spain, France and Malta net imports was on higher level than gross available energy from natural gas (accordingly 101,4; 104,7; 109,5%). This proves a dependency of this energy source. The lowest value of the ratio was observed for Croatia (53,3%). The closest to EU-27 ratio value (83,2%) was Poland (77,6%). Germany, however has almost the same value of net imports as a gross available energy from natural gas.

Primary energy production in the EU in 2018 was spread across a range of different energy sources, the most important of which in terms of the size of its contribution were the renewable energy sources, with more than one third (34.2 %) of the EU's total production. The share for solid fossil fuels (18.3 %, largely coal) was just below one fifth and the share for natural gas was close to one tenth (9.3 %). Crude oil (3.4 %) was the only other major source of primary energy production. Level of Renewable Energy (34.2 %) in 2018 was divided into: geothermal (3,1%); ambient heat (5,3%); solar (6,3%); wind (12,7%); hydro (13,6%), bioenergy&waste (58,9%)⁵². Energy from renewable sources used in transport for EU-27 measures as share of gross final energy consumption was on 8,3% level. The highest share of renewable sources used in transport was rated for France (9%) the lowest for Croatia (3,9%) what was over two times less than France.

Eurostat onnine data, based on Eurostat Energy, transport and ... p. 12











⁵⁰ Eurostat online data; based on Eurostat Energy, transport and ... p.37

⁵¹ Eurostat online data; based on Eurostat Energy, transport and ... p. 14

⁵² Eurostat online data; based on Eurostat Energy, transport and ... p. 12





Malta and Germany has ratio on similar 8% level. The highest level of production of renewables and biofuels in 2018 was in Germany (43 million tonnes of oil equivalent). In Malta there is no such production at all. Spain produces less than half (18,8) of what Germany does. France however uses 27,6 million tons of oil equivalent as an energy from renewable sources.

To analyze the competitive position of each SEA-EU country, from energy sector point of view, a simplified multidimensional comparative analysis was used. Using the variable standardization process, the value of the synthetic variable was determined (see Figure 5.). The model used the variables presented in Table 11 and Table 12. The model consists in determining a positive development pattern, the vector of which consists of the maximum values of the variables for individual objects (SEA-EU consortium countries).

Figure 5. Multivariate synthetic ratio of competitive position in energy sector at SEA-EU consortium countries in 2018



Source: Own preparation based on data from: Eurostat online data; based on Eurostat Energy, transport and environment statistics https://ec.europa.eu/eurostat/documents/3217494/11478276/KS-DK-20-001-EN-N.pdf/06ddaf8d-1745-76b5-838e-013524781340?t=1605526083000; Eurostat online data; based on Eurostat Energy, transport and environment statistics 2020 https://ec.europa.eu/eurostat/documents/3217494/11478276/KS-DK-20-001-EN-N.pdf/06ddaf8d-1745-76b5-838e-013524781340?t=1605526083000

The lower the value of the synthetic ratio, the higher the competitive position of the object - SEA-EU country (positive development pattern has value equals 0). The multidimensional ranking of the competitive position in 2018 of the SEA-EU consortium from energy sector point of view is as follows (from the country with the best competitive position to the weakest): Germany, France, Spain, Poland, Croatia and Malta.















4.3 Summary assessment

Among the SEA-EU consortium countries, the most diversified area of energy production is in Germany. Without taking into account "natural gas" and "crude oil" Spain came second in this area. France, Croatia and Malta do not produce energy from Solid fossil fuels. Whereas Malta has 100% renewable energy production. Noteworthy is also the fact that in Croatia, Malta and Poland there is no nuclear energy production. Nuclear energy was second of the total primary energy production. In 2018 the significance of nuclear energy was particularly high in France where it accounted for over three fourth of the national production of primary energy. The decrease of primary energy production in the EU over the past decades resulted in increased imports of primary energy and energy products. The dependency for crude oil during the same period remained constant. The highest ratio of Energy dependency on oil and petroleum products (excluding biofuels) for SEA-EU consortium countries was rated for Spain and Poland. The lowest value resulted for Croatia. Germany energy dependency ratio was closest to the EU-27 level. In Croatia almost half of all the electricity consumed was generated from renewable energy sources. On the other hand, in Malta it is only 7,7%. Germany and Spain noted value of the ratio close do EU-27 level. For SEA-EU consortium one of the key areas in this regard is Marine Renewable Energy (MRE). It includes all renewable energy sources. MRE represent an important source of green energy and can make a significant contribution to the EU's 2050 energy strategy. Moreover, the MRE sector presents a great potential to generate economic growth and jobs, enhance the security of its energy supply and boost competitiveness through technological innovation. The growth of marine energy, in particular offshore wind creates potential synergies with the offshore oil and gas sector, with competencies required to construct and maintain offshore projects and to operate in harsh marine environments. Integration could bring benefits in terms of reduced costs, improved environmental performance and utilisation of infrastructure. The possibility to provide electricity to offshore oil and gas operations where there are wind farms nearby, or via floating turbines, reducing the need to run diesel or gas-fired generators on the platform and reducing emissions of carbon dioxide and air pollutants. The potential synergies extend well beyond the energy sector to encompass shipping, port infrastructure and other maritime industries. Port activities and Shipbuilding and repair (shipyards) benefit from the economic potential of offshore wind energy. Ports are home to the manufacturers of offshore wind turbines and their large components, as well as project developers and logistics companies. Coastal regions benefit in particular from this development, inland suppliers also benefit, e.g. from the metal and mechanical engineering industries, technical service providers, insurance or financing companies, certifiers and consulting firms⁵³.

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⁵³ European Commission (2020). The EU Blue Economy Report. 2020. Publications Office of the European Union. Luxembourg





5. Advanced technology/High-tech/ICT

5.1 Policy priorities

In a knowledge based economy advanced technologies in High-tech and ICT are without doubt the fundamental ingredients for development. In the EU, ICT-related innovation represents between 17% and 26% of total innovative output. With its annual R&D expenditure of 27 billion EUR (2009), the ICT industry represents 17% of total European Business Expenditure in Research and Development (BERD). The Digital Agenda for Europe aimed to double both business expenditures in R&D in the ICT economic sector (ICT BERD), and public funding of ICT R&D, from 2007 to 2020⁵⁴. ICT supply, ICT R&D, ICT specialists are key to growth and competitiveness. This is reflected in the political priorities of the European Union for more than two decades, and again in the most recent political agendas and flagships of the current European Commission. ICTs determine competitive power in contemporary economy and are the technologies underpinning the digital transformation of the economy and of society. Besides the impact that technological uptake has on the organisation of businesses, the ICT sector also plays an important enabling role for innovation in other technological domains. "A Europe fit for the digital age" has been identified as one of the six European Commission priorities for the 2020-2024 period, and envisions Europe as a strong digital player in its own right⁵⁵.

New ICTs have transformed the production process of many existing economic sectors, particularly by facilitating the diffusion of robotisation and automation. These technologies, which underpin the digital transformation of economy and society, have led to the development of entirely new processes of production and retail, hence, determining new competitive powers in the knowledge economy. New sectors have been born and many others have been adapted. Moreover, their role in the phenomenon of globalization and in the fragmentation of production processes in different stages (the so called global value chains) is crucial. ICT is a key sector in changing business organizations and in enabling innovations in many techno-economic domains. Its impact on people's everyday life is pervasive. The COVID-19 pandemic, which has profoundly affected almost every country in the world, has unveiled the crucial role played by ICT and its R&D in the control of the infected population; the answer to the shortage of appropriate equipment (i.e. the use of 3D printers technology); the great stimulus given to online education; not to mention its role in reducing the cost of confinement, both in terms of human lives and lost production, thanks to the possibilities offered by teleworking. The COVID-19 outbreak has meant, among many other things, a tremendous boost to the penetration of ICTs in all areas. The relevance of this sector is strategic for the EC. However, this is not something new, since the relevance of this sector has been long ago recognized at the EU policy intervention

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⁵⁴ https://ec.europa.eu/jrc/en/research-topic/ict-rd-and-innovation

⁵⁵ <u>https://ec.europa.eu/jrc/en/predict</u>





level. The Digital Agenda for Europe in 2010, in the perspective of maximising its social and economic potential, identified the development of ICT as one of the seven pillars of the Europe 2020 Strategy for growth in the Union⁵⁶.

5.2 Socio-economic dimension

In the international context, the EU28 holds an intermediate position in value added (VA), employment and Business Expenditure on Research and Development (BERD). Whereas the EU28 ICT sector accounted for 4,1% of total VA in the economy and 2,7% of employment in 2017, the ratios in Taiwan (16,3% in VA, 9,1% in employment), South Korea (9,2%, 4,5%), Japan (5,8%, 3,3%) or even in the US (5,9%, 2,7%) were notably higher. Europe also lagged behind the leaders according to its BERD intensity (BERD/VA) in the ICT sector. In 2017, the EU28 ICT sector BERD intensity (5,1%) has been much lower than in South Korea (20,2%), Taiwan (11,9%) and the US (10,6%). China (6,0%) and Australia (5,7%) show BERD intensity levels similar to the EU28. In 2017, the annual growth of the EU28 ICT sector VA (6,5%) was modest, lagging far behind China (13,0%), Australia (8,8%), and Taiwan (7,2%). The EU28 ICT BERD growth in 2017 (4,4%) was among the lowest of all the countries available, and the difference with the more dynamic countries is remarkable: Australia (15,7%), China (13,2%) and Taiwan (12,1). In 2017, ICT Government budget allocations for Research and Development (GBARD) in the EU28 (ICT GBARD/GDP on the level 0,04%) was lower than in the US (0,05%) and Japan (0,06%)⁵⁷.

Still the ICT sector is one of the most dynamic sectors in the EU economy, standing out for its high R&D intensity and for a productivity that is higher than that of the whole economy. The size of the EU28 ICT sector in 2017 amounted to 630 billion euros value added (VA), employed 6,3 million people and spent 32 billion euros on R&D (BERD) business expenditures. The ICT sector represented 4,1% of the EU28 total value added, 2,7% of total employment, 15,2% of total BERD, and 18,1% and 20,4% of the R&D personnel and researchers in the EU28, respectively. The development from 1995 until 2017 shows that the EU28 ICT sector multiplied its value added in real terms by a factor of 3,8. Total economy increased by 1.5 at that time. The growth of employment was much more moderate: the number of persons employed in ICT in 2017 is 1,5 times the number of persons employed in the same sector in 1995. Labour productivity in the ICT sector grew much faster than labour productivity in the total economy. The value reached in 2017 is 2,5 times the value of 1995.

⁵⁷ Ibid. p.51











⁵⁶ Mas, M., Fernández De Guevara, J., Robledo, J.C., Cardona, M., Righi, R., Samoili, S., Vazquez-Prada Baillet M, López Cobo, M. (Editor) and De Prato, G. (Editor), The 2020 PREDICT Key Facts Report. An Analysis of ICT R&D in the EU and Beyond, EUR 30305 EN, Publications Office of the European Union, Luxembourg, 2020, ISBN 978-92-76-20790-0, doi:10.2760/291872, JRC121153





Business expenditure in R&D (BERD) in the ICT sector presents a behaviour that is more dynamic than the one of the total economy. From 1995 to 2017, its value multiplied by a factor of 3,5. In the same period, the BERD of the total economy only grew 1,9 times⁵⁸.

Analysing the ICT sub-sectors reveals that the more dynamic behaviour of the ICT sector in the EU28 is mostly due to the ICT services sector. ICT manufacturing experienced a sharp contraction from the beginning of the economic crisis, in 2007, in VA and BERD. In the ICT manufacturing sector, employment halved between 1995 and 2019. The combined trends of VA and employment produced a higher growth rate of ICT manufacturing labour productivity than what is observed in ICT service sectors. Regarding research expenditure, in the last two years before the economic crisis, the ICT manufacturing sector had a share (10%) of total BERD higher than the one of ICT services (8,6%). Since the beginning of the 2007 crisis, ICT manufacturing has followed a continuous declining path, while ICT services sector has shown an increase. The most important ICT subsectors presenting the highest shares over the total economy are two ICT services sub-sectors Computer and related activities and Telecommunications, and the Media and content (MC) sector. In terms of research activity, the sub-sector Computer and related activities is always the one showing, by far, the highest amount of private business expenditure (BERD), but the sub-sector Manufacture of communications equipment has the highest research intensity. Telecommunications is the sub-sector with the highest labour productivity, it is around 2,5 times higher than in the overall economy⁵⁹. Unfortunately for year 2020 predictions are negative with decrease of value added in amount of over 100 billion EUR. This is probably due to the negative impact of the pandemic Covid 19 on the European economy.

In 2018, among the SEA-EU Members, Malta had the highest Business expenditure on R&D (BERD) in ICT sector as % of total R&D expenditure (6,15%) (see Table. 13). France was second in this aspect (3,75%) and Germany third (2,35%). Croatia noted the lowest Business expenditure on R&D (BERD) in ICT sector as % of total R&D expenditure (0,05%). Once again Malta had the best outcome in 2018, this time in percentage of the ICT personnel in total employment (4,77%). Germany came in second place (3,16%) and France third (3,07%). Spain registered the lowest value in this area (2,48%) close to Poland with its 2,54%. Malta was able to gain 7,98% of GDP in ICT sector and that gave Malta position of the leader among SEA-EU members in this field. This time Croatia was second (4,45%), France third (4,31%) but Spain was the last again (3,28% of the ICT sector in GDP). As it comes to R&D personnel in ICT sector as % of total R&D personnel Malta had the highest score again (4,68%). Germany was second, France third and Croatia sixth. Analyzing apparent labour productivity in the ICT sector in thousand EUR per person employed occurred that in 2018 France was

⁵⁸ Mas, M., Fernández De Guevara, J., Robledo, J.C., Cardona, M., Righi, R., Samoili, S., Vazquez-Prada Baillet M, López Cobo, M. (Editor) and De Prato, G. (Editor), The 2020 PREDICT Key Facts Report. An Analysis of ICT R&D in the EU and Beyond, EUR 30305 EN, Publications Office of the European Union, Luxembourg, 2020, ISBN 978-92-76-20790-0, doi:10.2760/291872, JRC121153 p.5 ⁵⁹ Ibid. p. 5-6















able to generate 102 thousand EUR per person employed. Germany was second with 95 thousand EUR per person. Malta was third. The worst result was observed for Poland – only 36 thousand EUR per person employed.

s	tate	Business expenditure on R&D (BERD) in ICT sector as % of total R&D expenditure	Percentage of the ICT personnel in total employment	Percentage of the ICT sector in GDP	R&D personnel in ICT sector as % of total R&D personnel	Apparent labour productivity in the ICT sector, (EUR thousand per person employed)
	Croatia (HR)	0,05	2,57	4,45	0,09	45
	France (FR)	3,75	3,07	4,31	2,32	102
	Germany (DE)	2,35	3,16	4,19	2,47	95
	Malta (MT)	6,15	4,77	7,98	4,68	79
	Poland (PL)	0,41	2,54	3,59	0,41	36
	Spain (ES)	0,49	2,48	3,28	0,59	72

Table 13. ICT sector by SEA-EU consortium countries in 2018

Source: Own preparation based on EUROSTAT database

Second advanced technology sector analyzed in this report is high-tech divided in two areas: High-tech manufacturing and High-tech knowledge intensive services. In 2018, 35,3 million people were employed in the manufacturing sector in the EU-28, a figure which represented 15,4 % of total employment. Of these, 2,4 million were employed in high-tech manufacturing, corresponding to 1,1 % of total employment. Almost three times as many were employed in high-tech knowledge intensive services , which accounted for 3,0 % of total employment⁶⁰ (see Table 14.).

In 2018, employment in high-tech manufacturing and services varied considerably from one SEA-EU country to another, when considered as proportion of total employment. In high-tech manufacturing, it ranged from 0,6 % in Spain to 1,7 % in Germany. Differences in terms of the relative importance of high-tech knowledge-intensive services in total employment were also observed across SEA-EU countries, with the largest proportions among the SEA-EU Members in Malta (3,8 %), while the lowest values were observed in Spain

⁶⁰ EUROSTAT High-tech statistics – employment, Statistics Explained, September 2020 <u>https://ec.europa.eu/eurostat/statisticsexplained/</u>















and Germany (both with 0,6 %). Within the EU-28, the average annual growth rate (AAGR) for employment in high-tech services was positive over the 2008-2018 period (1,8%). For employment in high-tech manufacturing unfortunately not (-0,4%). This decrease can be partially explained by the economic crisis.

Table 14. Employment in High-tech sectors	by SEA-EU consortium countries,	EU28 Member States in
2018		

	High-tech r	nanufacturing			High-tech knowledge intensive services			
Member State	Total in 1000's	% of total employment	% of women	AAGR 2008- 2018	Total in 1000's	% of total employment	% of women	AAGR 2008- 2018
Croatia (HR)	11,9	0,7	53,8	-1,4	55	3,3	30,5	3,7
France (FR)	241,1	0,9	40,1	-2,4	866	3,2	30,8	2,2
Germany (DE)	697,9	1,7	35,6	1,7	1040	2,5	33,3	0,6
Malta (MT)	3,8	1,6	36,8	-1,3	9	3,8	26,1	3,8
Poland (PL)	127,3	0,8	50,7	0,2	398	2,4	30,6	3,1
Spain (ES)	112,7	0,6	45,1	-0,9	586	3,0	29,1	0,6
EU28	2440,9	1,1	39,6	-0,4	6993	3,0	30,0	1,8

Abbreviations: AAGR – Average Annual Growth Rate

Source: Own preparation based on EUROSTAT High-tech Statistics Explained (https://ec.europa.eu/eurostat/statisticsexplained/) - 27/09/2019

The highest level of employment in High-tech manufacturing among SEA-EU countries was observed for Germany (almost 698 thousand employees). It is over one third of all EU28 Members and more than rest of five SEA-EU consortium countries. The second at this comparison was France (hiring over 240 thousand employees). Third place was almost ex aequo for Poland (127,3) and Spain (112,7). The lowest employment in High-tech manufacturing in 2018 was in Croatia (almost 12 thousand) and Malta (3,8 thousand employees). However regarding to percentage of total employment in High-tech manufacturing industry Malta has 1,6% ratio what is the second highest value. The first one is for Germany with 1,7% of share of total employment. Spain had the lowest value of compared ratio (0,6% of total employment). Croatia and Poland was ranked slightly higher (accordingly 0,7 and 0,8). In proportion, the largest number of women are employed in Croatia (almost 54%). The lowest number goes to Germany (35,6%) and Malta (36,8%). Slightly more than half of the employees of High-tech manufacturing are women in Poland.





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In High-tech knowledge intensive services sector in 2018 EU28 employed almost three times more (nearly 7 million employees) than in High-tech manufacturing sector. The leader in this field was Germany (over a million employees). France was ranked second with 866 thousand High-tech knowledge intensive services workers. In nominal terms Malta was the worst with only 9 thousand employees. Croatia was not much better with only 55 thousand workers in High-tech knowledge intensive services. However, the situation changes in the case of relative indicators. Malta has the highest among SEA-EU Members rate of total employees percentage in mentioned sector (3,8%). This also applies to Croatia (3,3%). These two countries overtook both France (3,2%) and Spain (3,0%). The lowest values of the ratio was observed for Germany and Poland (accordingly 2,5% and 2,4%). In this sector, a decline in the value of the female employment rate is noticeable. The highest rate of women as an employee in High-tech knowledge intensive services was for Germany (33,3%). The lowest one for Malta (26,1%). EU-28 average was lower also with near one third of employment structure. Much better than in High-tech manufacturing occurred indicators on annual average growth rate. They were all positive for SEA-EU Members and what is worth noticing Croatia and Malta had the highest rates of growth (3,7% and 3,8%).

To analyze the competitive position of each SEA-EU country, from advanced technology/IT/ICT point of view, a simplified multidimensional comparative analysis was used. Using the variable standardization process, the value of the synthetic variable was determined (see Figure 6.). The model used the variables presented in Table 12 and Table 13. The model consists in determining a positive development pattern, the vector of which consists of the maximum values of the variables for individual objects (SEA-EU consortium countries).

Figure 6. Multivariate synthetic ratio of competitive position in advanced technologies/IT/ICT sector at SEA-EU consortium countries in 2018



Source: Own preparation based on data from: 2020 PREDICT Dataset; EUROSTAT High-tech Statistics Explained (https://ec.europa.eu/eurostat/statisticsexplained/) - 27/09/2019;



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The interpretation is the same as in the previous cases. The lower the value of the synthetic ratio, the higher the competitive position of the object - SEA-EU country (positive development pattern has value equals 0). The multidimensional ranking of the competitive position in 2018 of the SEA-EU consortium from advanced technology/IT/ICT point of view is as follows (from the country with the best competitive position to the weakest): Germany, France and Malta (ex aequo) on second place. Poland, Croatia and Spain ex aequo third place. This situation occurred because one can observe two clusters. First one with France and Malta (very close results near 5,7) and another one with Poland, Croatia and Spain (result between 7,2 and 7,3).

5.3 Summary assessment

Advanced Technologies like High-tech and ICT, which supports the digital transformation of economy and society, have led to the development of entirely new processes determining new competitive generators in the knowledge based economy. This sector plays an important enabling role for innovation in other technological domains and that is why European Commission has formed six priorities for the 2020-2024 period with: "A Europe fit for the digital age". In last two decades new sectors have been created and many others have been adapted. Moreover, the role of High-tech and ICT in global value-chain is crucial. ICT is a key sector in changing business organizations and in implementing innovations in many techno-economic aeras. Its impact on people's everyday life is widespread. Just having an example from last year with COVID-19 pandemic, which has profoundly affected almost every country in the world, ICT has unveiled its the crucial role in economy. Nevertheless due to the negative impact of the pandemic Covid 19 on the European economy predictions for 2020 are negative with decrease of value added in amount of over 100 billion EUR.

The EU28 ICT sector accounted for 4,1% of total VA in the economy and 2,7% of employment in 2017, but the ratios in Taiwan, South Korea, Japan or even in the US were notably higher. Still the ICT sector is one of the most dynamic sectors in the EU economy, standing out for its high R&D intensity and for a productivity that is higher than that of the whole economy with its size of 630 billion euros value added in 2017 and employment around 6,3 million people. The multidimensional ranking of the competitive position of the SEA-EU consortium from advanced technology/High-tech/ICT point of view visualized dominant role of Germany. France and Malta (ex aequo) was on second place. Poland, Croatia and Spain ex aequo third place.















6. Tourism/Mobility

6.1 Policy priorities

Tourism is a major economic activity in the European Union with wide-ranging impact on economic growth, employment, and social development. It can be a powerful tool in fighting economic decline and unemployment. Nevertheless the tourism sector faces a series of challenges. The European Commission works to address these with policies and actions⁶¹. The EU Green Deal and the Europe Fit for the Digital Age are - among the top six priorities of the European Commission - the ones leading the so called Twin Transition. Mobility is one of the sectors targeted among both strategies: The EU Green Deal refers to: "Accelerating the shift to sustainable and smart mobility" and the Digital Age identifies transport and mobility among the sectors through which digital technologies will enable the carbon- neutrality: "Support automated and connected transport". Despite not being directly mentioned, Tourism needs to be aligned to and recognized by the EU Green Deal to Europe successfully reach the 2050: the Circular economy priority applies to all sectors, including Tourism, in its ambition to embed sustainable consumption and production, plastic reduction, among others. The new EU Industrial Strategy will makes sure EU businesses can take advantage of the opportunities digitalization and new technologies can endeavor to their competitiveness while contributing to sustainably. Tourism, will be part of this strategy.

EU policy aims to maintain Europe's standing as a leading destination while maximising the industry's contribution to growth and employment and promoting cooperation between EU countries, particularly through the exchange of good practice. The EU's competence in the tourism is one of support and coordination to supplement the actions of member countries. The main challenges for the European tourism industry are⁶²:

- security and safety environmental, political, and social security; safety of food and accommodation; and socio-cultural sustainability threats;
- economic competitiveness seasonality, regulatory and administrative burdens; tourism related taxation; difficulty of finding and keeping skilled staff;
- technological keeping up to date with IT developments caused by the globalisation of information and advances in technology (IT tools for booking holidays, social media providing advice on tourism services, etc.);

⁶² https://ec.europa.eu/growth/sectors/tourism/policy-overview_en













⁶¹ https://ec.europa.eu/growth/sectors/tourism_en





 markets and competition - growing demand for customised experiences, new products, growing competition from other EU destinations.

In June 2010, the European Commission adopted the Communication, "Europe, the world's No. 1 tourist destination – a new political framework for tourism in Europe". This communication set out a new strategy and action plan for EU tourism. In this document four priorities for action were identified⁶³:

- 1. To stimulate competitiveness in the European tourism sector;
- 2. To promote the development of sustainable, responsible, and high-quality tourism;
- 3. To consolidate Europe's image as a collection of sustainable, high-quality destinations;
- 4. To maximise the potential of EU financial policies for developing tourism.

A regularly updated implementation rolling plan has been developed that outlines the major initiatives to be implemented as part of the strategy, in collaboration with public authorities, tourism associations and other public/private tourism stakeholders. To date, the Commission has successfully implemented the majority of the actions set out in the Communication, focusing on the following priorities⁶⁴:

- increasing tourism demand, from within the EU and beyond;
- improving the range of tourism products and services on offer;
- enhancing tourism quality, sustainability, accessibility, skills, and ICT use;
- enhancing the socio-economic knowledge base of the sector;
- promoting Europe as a unique destination;
- mainstreaming tourism in other EU policies.

Although not being new, the Tourism and Mobility alliance is not a widely spread practice, reason for which the acknowledgement of market intelligence, customers behavioral as well as real cases is needed to get inspiration and start generating a critical mass. The alliance of both sectors, has innumerable benefits for the destinations: improving coordinated and effective governance, improving the quality of life of residents and the experience of tourists, managing the mobility flows, accessing to data, improving services, building

⁶⁴ <u>https://ec.europa.eu/growth/sectors/tourism/policy-overview_en</u>











⁶³ https://ec.europa.eu/growth/sectors/tourism/policy-overview_en





sustainable tourism products, and many more⁶⁵. The European Commission works on a number of initiatives to diversify and improve the range of tourism products and services available in areas such as sustainable tourism, accessible tourism, tourism for seniors, and low-season tourism⁶⁶.

6.2 Socio-economic dimension

In tourism/mobility area related to SEA-EU countries the most significant is coastal and maritime tourism sector. This is important as The European Commission is implementing a strategy to increase growth and jobs especially in the coastal and maritime tourism sector. The beauty, cultural wealth and diversity of the EU's coastal areas have made them a preferred destination for many holidaymakers in Europe and abroad, making coastal and maritime tourism an important tourism sector. Employing over 3,2 million people, this sector generates a total of EUR 183 billion in gross value added and represents over one third of the maritime economy. As much as 51% of bed capacity in hotels across Europe is concentrated in regions with a sea border. As part of EU's Blue Growth strategy, the coastal and maritime tourism sector has been identified as an area with special potential to foster a smart, sustainable and inclusive Europe⁶⁷.

Arrivals in tourism sector by SEA-EU consortium countries in 2018 presents as follows. All the ratios are relative or there are per capita or percentage (see Table 15.). According to Total number of arrivals per capita best result was observed for Croatia (4,51). Not much less was in Malta (4,23). Spain was on third position (2,80). France was fourth, Germany fifth. The last place according to total number of arrivals per capita in 2018 was observed for Poland (only 0,89). From residents per capita arrivals perspective the Best SEA-EU member was France (1,77). Germany was second Spain third. Rest of the results was below 1. The worst ratio value was observed for Malta (only 0,39).

⁶⁷ https://ec.europa.eu/growth/sectors/tourism/offer/maritime-coastal_en



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⁶⁵ <u>https://necstour.eu/good-practices/mobility-and-tourism-alliances-stimulate-destinations-twin-transition</u>

⁶⁶ <u>https://ec.europa.eu/growth/sectors/tourism_en</u>





		Arrivals									
					Residents						
			Non-		change (%)	Non-residents					
	Total	Residents	residents	Arrivals change	over the	change (%)					
	number per	number per	number	(%) over the	previous	over the					
Member State	capita	capita	per capita	previous year	year	previous year					
Croatia (HR)	4,51	0,48	4,02	7,10%	10,20%	6,80%					
France (FR)	2,56	1,77	0,78	2,80%	0,90%	7,30%					
Germany (DE)	2,16	1,69	0,46	4,00%	4,10%	3,90%					
Malta (MT)	4,23	0,39	3,84	8,40%	10,50%	8,20%					
Poland (PL)	0,89	0,70	0,18	6,00%	6,50%	4,10%					
Spain (ES)	2,80	1,39	1,41	1,10%	1,40%	0,80%					

Table 15. Arrivals in tourism sector by SEA-EU consortium countries in 2018

Source: Own preparation based on: https://ec.europa.eu/growth/tools-databases

As it comes for non-residence arrivals per capita in 2018 the highest scores was for Croatia (4,02) and Malta (3,84). Spain was third (1,41). Poland has the lowest value of this ratio (only 0,18).

Concerning nights spent in tourism there can be assumption of length of arrivals described above. The longest time tourists spent in Spain (nearly 467 million nights) (see Table 16.). Compared to arrivals at that time gives average of almost 4 days of stay period. In France tourists spent 442 million nights. Almost 420 million nights spent in Germany gives average of 2,5 day visit. In Croatia almost 89 million nights spent shifts to almost 5 day period of visit. Malta reached the same 5 day result. Poland attracts tourist for average 2,5 day with 88 million nights spent in 2018.















		Nights spent								
		Nights spent		Residents		Non-residents				
		change (%)	Residents	change (%)	Non-	change (%)				
	Total (in	over the	(in	over the	residents (in	over the				
Member State	thousand)	previous year	thousand)	previous year	thousand)	previous year				
Croatia (HR)	89567,7	4,00%	6427,8	8,60%	83139,9	3,70%				
France (FR)	442760,1	2,20%	302038,7	0,80%	140721,4	5,40%				
Germany (DE)	419556,3	4,60%	332594,4	4,60%	86961,9	4,60%				
Malta (MT)	10114,2	5,60%	429,0	8,30%	9685,2	5,50%				
Poland (PL)	88860,5	5,90%	71117,8	5,90%	17742,7	6,20%				
Spain (ES)	466940,7	-0,90%	165918,1	0,40%	301022,6	-1,60%				

Table 16. Nights spent in tourism sector by SEA-EU consortium countries in 2018

Source: Own preparation based on: https://ec.europa.eu/growth/tools-databases

Among all SEA-EU countries Malta has the highest (15,3%) share of tourism industries employment in total non-financial business economy (see Table 17.). Spain and Croatia noted in 2018 12% value of the same ratio. Below one tenth of this share were: Germany (8,4%), France (7,3%) and Poland where only 4,1% of total non-financial business economy employment concerns tourism. Regarding to the number of enterprises per capita from sectors related to tourism (tourism industries, accommodation, food and beverage, travel agencies and tour operators) results are as follows. In tourism industries the largest number of enterprises per capita was observed in Malta (0,008197). Croatia and Spain had similar results (accordingly 0,006261 and 0,006369). Poland with its 0,003174 ratio was rated on the last place. Germany was before last. As it comes with accommodations Malta is still the leader of companies number per capita, second place was for France and Croatia. Germany was third in this area.















			Number of	enterprises	
	Tourism industries -				Travel
	employment as % of	Tourism		Food and	agencies, tour
	total non-financial	industries	Accomodation	beverage	operators per
Member State	business economy	per capita	per capita	per capita	capita
Croatia (HR)	12,20%	0,006261	0,000738	0,004098209	0,000523
France (FR)	7,30%	0,004990	0,000763	0,002932992	0,000135
Germany (DE)	8,40%	0,003211	0,000545	0,002075384	0,000159
Malta (MT)	15,30%	0,008197	0,000951	0,004106846	0,000987
Poland (PL)	4,10%	0,003174	0,000417	0,001169591	0,000197
Spain (ES)	12,30%	0,006369	0,000562	0,005280273	0,000310

Table 17. Tourism industry by SEA-EU consortium countries in 2018

Source: Own preparation based on: https://ec.europa.eu/eurostat/statistics-explained

Spain occurred the leader in number of food and beverages companies per capita (0,005280273). Malta and Croatia was ranked second. France third. It is easier to find travel agency or tour operator in Malta and Croatia (accordingly 0,000987and 0,000523). Worst result was observed for France (0,000135), Germany (0,000159) and Poland (0,000197).

Concerning mobility issue. People in today's Europe are constantly on the move. This mobility can be viewed from many angles, as there are many reasons for moving: migration, education, work or tourism. Among the 447 million persons living in the EU in 2019, 8 % had a nationality other than their country of residence: 3 % had a citizenship of another EU Member State and 5 % of a non-EU Member State. These shares differed among the Member States. In 2019, Luxembourg had the largest share of citizens of another EU Member State (39 % of the population) followed by Austria and Belgium (both 8 %). The largest proportions of citizens originating from outside the EU were found in Estonia and Latvia (both 14 %), Luxembourg and Austria (both 8 %). Malta and Croatia had 26 thousand immigrants in 2018. Poland has 214 thousand immigrants. Further in the order they were: France 387, Spain 643 and Germany 893 thousand immigrants. EU28 ratio was 4,5 million people⁶⁸.

The number of people emigrating from the EU Member States has also fluctuated in recent years. Like for immigration, this includes people who have emigrated both on a permanent basis as well as for a period of

⁶⁸ <u>https://ec.europa.eu/eurostat/cache/digpub/eumove/</u>















one year or more. In 2018, 3 million persons emigrated from an EU Member State, including both people emigrating to another EU Member State and those to a country outside the EU, a number which increased by 7 % since 2013. In 2018, a majority (54 %) of those emigrating were nationals, meaning citizens from the reporting country, 25 % were citizens of another EU Member State, while 22 % were non-EU citizens. The lowest number of emigrants in 2018 where observed in Malta (9 thousand people). At that time, 39 thousand people left Croatia. 189 thousand people decided to left Poland. 300 thousand left France and Spain. Over half of million people emigrated from Germany that time⁶⁹.

The Erasmus+ programme is a European Union student exchange programme, which supports students to spend part of their studies at another higher education institution abroad. In 2018, around 111 000 bachelor graduates and around 85 000 master graduates had benefitted from this programme. For Erasmus+ bachelor graduates, the main exchange destination country was Germany (22 800 graduates or 21 % of total bachelor Erasmus graduates in the EU in 2018), followed by Spain (22 000 or 20 %), France (15 000 or 13 %), Italy (11 200 or 10 %) and the Netherlands (10 400 or 9 %). Together, these five Member States were the destination of two thirds of all bachelor Erasmus graduates in 2018. Mobile tertiary students from abroad in 2018 at SEA-EU countries (as % of all students in tertiary education) presents as follows⁷⁰: Germany: 10%; Malta: 10%; France 8,8%; Poland 3,6%; Spain 3,5%; Croatia 3,0%;

Another way of looking at employment by citizenship is by the share of non-nationals in total employment. In the EU in 2019, the share of other EU citizens (those with a citizenship of another Member State than the one they were living in) in total employment was 4 % and for non-EU citizens 5 %. Going more in detail, by sector, the shares were 3 % for other EU-citizens and 5 % for non-EU citizens in the service sector, 4 % each in the industrial sector and 3 % and 4 % respectively in agriculture. Employment of EU non-nationals by sector in 2019 (% of employed aged 20-64) at SEA-EU countries presents as follows⁷¹: Malta: 15,4%; Spain: 7,7%; Germany: 6,4%; France: 4,0%; Poland: 0,6%; Croatia: 0,1%;

In 2019, the largest number of cross-border workers among the Member States were for those living in Poland and working in Germany (122 000 people), France and Luxembourg (93 000), Hungary and Austria (56 000), Germany and Luxembourg (54 000) and France and Belgium (50 000). Cross border workers are mostly men in the construction field. Spain, Malta and Croatia where out of range with this matter⁷².

To analyze the competitive position of each SEA-EU country, from tourism/mobility point of view, a simplified multidimensional comparative analysis was used. Using the variable standardization process, the value of the











⁶⁹ <u>https://ec.europa.eu/eurostat/cache/digpub/eumove/</u>

⁷⁰ https://ec.europa.eu/eurostat/cache/digpub/eumove/

⁷¹ https://ec.europa.eu/eurostat/cache/digpub/eumove/

⁷² <u>https://ec.europa.eu/eurostat/cache/digpub/eumove/</u>





synthetic variable was determined (see Figure 7.). The model used the variables presented in Table 15, Table 16 and Table 17. The model just like in previous S3 areas consists in determining a positive development pattern, the vector of which consists of the maximum values of the variables for individual objects (SEA-EU consortium countries).

Figure 7. Multivariate synthetic ratio of competitive position in Tourism/Mobility sector at SEA-EU consortium countries in 2018



Source: Own preparation based on data from: <u>https://ec.europa.eu/eurostat/statistics-explained;</u> <u>https://ec.europa.eu/growth/tools-databases</u>

The interpretation is the same as in the previous multivariate analysis in this report. The lower the value of the synthetic ratio, the higher the competitive position of the object - SEA-EU country (positive development pattern has value equals 0). The multidimensional ranking of the competitive position of the SEA-EU consortium from tourism/mobility point of view is as follows (from the country with the best competitive position to the weakest): Malta and Croatia (ex aequo first place), France, Germany, Spain and Poland on the last place.















6.3 Summary assessment

Tourism is a major sector of activity in the European Union with significant impact on economic growth, employment, and social development. "Accelerating the shift to sustainable and smart mobility" as well as "Support automated and connected transport" is crucial for EU Green Deal and the Europe Fit for the Digital Age are – which are among the top six priorities of the European Commission. According to EU tourism policy the main challenges for the European tourism industry are: security and safety, economic competitiveness, technological, markets and competition. At the same time EU in new political framework for tourism in Europe proposed priorities for action like: To stimulate competitiveness in the European tourism sector; To promote the development of sustainable, responsible, and high-quality tourism; To consolidate Europe's image as a collection of sustainable, high-quality destinations; To maximise the potential of EU financial policies for developing tourism; increasing tourism demand, from within the EU and beyond; improving the range of tourism products and services on offer; enhancing tourism quality, sustainability, accessibility, skills, and ICT use; enhancing the socio-economic knowledge base of the sector; promoting Europe as a unique destination; mainstreaming tourism in other EU policies.

In tourism/mobility area related to SEA-EU countries the most significant is coastal and maritime tourism sector. Coastal and maritime tourism is an important sector employing over 3,2 million people and generates a total of EUR 183 billion in gross value added and represents over one third of the maritime economy. In 2018 the longest time tourists spent in Croatia and Malta it is 5 days. In Spain it is 4 days of stay period. In France tourists like in Poland and Germany spent in average over a 2,5 day visit. Mobile tertiary students from abroad in 2018 at SEA-EU countries (as % of all students in tertiary education) presents as follows⁷³: Germany: 10%; Malta: 10%; France 8,8%; Poland 3,6%; Spain 3,5%; Croatia 3,0%. In 2019 Employment of EU non-nationals by sector in 2019 (% of employed aged 20-64) at SEA-EU countries presents as follows⁷⁴: Malta: 15,4%; Spain: 7,7%; Germany: 6,4%; France: 4,0%; Poland: 0,6%; Croatia: 0,1%. In sum the multidimensional ranking of the competitive position of the SEA-EU consortium from tourism/mobility point of view in 2018 is as follows: Malta and Croatia (ex aeguo first place), France, Germany, Spain and Poland on the last place.











⁷³ https://ec.europa.eu/eurostat/cache/digpub/eumove/ ⁷⁴ https://ec.europa.eu/eurostat/cache/digpub/eumove/





7.Conclusions

The purpose of this report was to compare the national Smart Specialization Strategies (3S) among the SEA-EU consortium countries. As a result of gaps mapping best practices of cooperation with socio-economic sector should occurred. Selected five sectors common in 3S (Maritime and Blue Growth, Health, Energy, Advanced technology/High-tech/ICT and Tourism/Mobility) have been analyzed. In each case (sector), the competitive position of individual SEA-EU countries was determined taking into account a simplified multidimensional analysis tool.

Table 18. Multivariate ranking position of SEA-EU countries from specified sector point of view in 2018

	Maritime and Blue Growth	Health	Energy	Advanced technology/High- tech/ICT	Tourism/Mobility
Germany (DE)	2	1	1	1	3
France (FR)	4	2	2	2	2
Spain (ES)	1	3	3	3	4
Poland (PL)	6	4	4	3	5
Croatia (HR)	3	4	5	3	1
Malta (MT)	5	3	6	2	1

Source: Own preparation based on previous calculations

Germany is the undisputed leader within the selected five sectors. In 3 of 5 sectors Germany took first place in ranking (see Table 18 and Figure 9.). France was second four times in this multivariate ranking. Spain was third three times. The result was differentiated in the case of the remaining SEA-EU consortium members. Not including Maritime and Blue Growth sector and Tourism/Mobility Spain was third in rest of the areas. Malta is the only SEA-EU member where any ranking position didn't occur twice or three times (Malta wasn't only on fourth place). Croatia was third two times. The best score was first place ex aequo with Malta in Tourism/Mobility. Poland was rated twice as forth. In case of Health and Energy. Was also rated as fifth in














case of Tourism/Mobility and sixth in case of Maritime and Blue Growth. The best (third) ranking place Poland has in Advanced technology/High-tech/ICT area.





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It is worth noting that sometimes the distances from the leader (measured as the Euclidean distance) are quite significant. This means that between countries such as Germany and France there can be creation of the so-called clusters. For example in Tourism/Mobility (see Figure 7.) we can observe cluster composed with Malta and Croatia (synthetic values 4,79 and 4,89). In case of Advanced Technology/High-tech/ICT synthetic ratio two clusters was observed: France and Malta on second place ex aequo (5,70 and 5,72 synthetic ratio) and another cluster combined with Poland, Croatia and Spain (7,19; 7,24; and 7,30). Last cluster was in health sector where Poland and Croatia took fourth place ex aequo.



Source: Own preparation based on previous calculations





Recommendations for best practices in socio-economic cooperation for SEA-EU consortium members may be divided also into areas convergent with analyzed five sectors. From **Maritime and Blue Growth** point of view the higher competitive position has Spain. Germany and Croatia was on second and third place. Therefore Poland, Croatia and Malta should expand nets through suppliers and enablers, share maritime infrastructure and boost Blue clusters and networks. This actions may be proceed in private and in public sector. In private sector it would be by expanding and transforming existing value chains. In public sector SEA-EU members should: enable competency development and knowledge sharing, use of maritime clusters as a tool to promote Smart Specialisation, stimulate trans-boundary cooperation and promote "Collaborative Laboratories". From human capital (employees) perspective Germany, Spain and France has strong competitive position in Maritime and Blue Growth. It turns out that access to the sea is not a sufficient factor to build a strong competitive position. It was confirmed that strong economies with a larger geographical area have not always a greater chance of building a strong competitive position in the Blue economy.

From Health sector point of view which was dominated in 2020 by a Covid-19 pandemic perspectives of development had to evolve. Previous goals such as: Vaccine hesitancy; Digital transformation of health promotion and disease prevention; Affordable, preventive and curative health care of good quality; Skill mix innovations; Affordable, innovative and sustainable medicines, were subordinated to prevent the spread of the coronavirus. Nevertheless besides actions and policy against pandemic there is still Health sector that probably will suffer from Covid-19. The challenges and gaps that have been exposed remain the same. Only in Croatia there have been not notices challenges in timely access to: Palliative care, Older people, Dementia patients, Patients with mental illness and Physically disabled people. In Spain there can be implemented innovations resolving problems in timely access to palliative care. In France to physically disabled people. Malta and Germany have three challenges to resolve. Poland can improve timely access to adapted services for older people and patients with mental illness. Some products or services created in SEA-EU consortium in health may be dedicated to prevent against disease. Disease prevention is commonly defined as having three dimensions, including primary (promoting good health and intervening before diseases ensue, e.g. vaccination campaigns), secondary (screening efforts to detect diseases in the earliest stages before onset of signs and symptoms, e.g. mammography) and tertiary (managing disease after diagnosis to slow or stop disease progression, e.g. rehabilitation, chemotherapy). There are still challenges in e-Health area. For SEA-EU consortium countries there was a clear disproportion in the area of seeking health information online with Individuals with different formal education.

Energy sector is a topic with high interest amongst the EU Member States and regions implemented Smart Specialization Strategy (S3PEnergy). The S3PEnergy promotes activities for achieving a shared vision on knowledge-based energy policy, accompanying European territories in the implementation of energy-related innovation strategies. The goal of the S3PEnergy is to set up a collaborative framework which will accelerate















the development and deployment of innovative low carbon technologies in the EU in the framework of Smart Specialisation. The highest level of production of renewables and biofuels in 2018 was in Germany. In Malta there is no such production at all. Spain produces less than half of what Germany does. Among the sea consortium countries, the most diversified area of energy production is in Germany. Not taking into account "natural gas" and "crude oil" Spain came second in this area. France, Croatia and Malta does not product energy from Solid fossil fuels. Furthermore in Croatia, Malta and Poland there is no nuclear energy production. Nuclear energy was second of the total primary energy production. In 2018 the significance of nuclear energy was particularly high in France where it accounted for over three fourth of the national production of primary energy. Energy sector gaps occurred naturally after analysis of SEA-EU members position in this area. The potential synergies extend well beyond the energy sector to encompass shipping, port infrastructure and other maritime industries. *Port activities* and Shipbuilding and repair (shipyards) benefit from the economic potential of offshore wind energy. Ports are home to the manufacturers of offshore wind turbines and their large components, as well as project developers and logistics companies.

From **Advanced technology/High-tech/ICT** point of view SEA-EU members can "compete" in diametral different conditions. Knowledge based economy with value drivers such as IT, High-tech or ICT is based on intangible resources. Advance technology is a key sector in changing business organizations and in enabling innovations in many techno-economic domains. Its impact on people's everyday life is pervasive. The COVID-19 pandemic, which has profoundly affected almost every country in the world, has unveiled the crucial role played by ICT and its R&D in the control of the infected population; the answer to the shortage of appropriate equipment; the great stimulus given to online education; not to mention its role in reducing the cost of confinement, both in terms of human lives and lost production, thanks to the possibilities offered by teleworking. What is crucial, economies/regions not develop as much as Germany and France (or their regions) may they can compete effectively in this area. The best example is Poland, which in this sector came third (highest rate of all sectors for Poland) in the multivariate analysis. It proves that high-tech or ICT or even IT may create value relatively more effectively due to the greater share of intangible assets.

Geographic location of SEA-EU members determine that **Tourism and Mobility** should be one of the key drivers of the region. Coastal and maritime tourism is probably the most important sector for SEA-EU members. It corresponds with EU recommendations to stimulate competitiveness in the European tourism sector; To promote the development of sustainable, responsible, and high-quality tourism; To consolidate Europe's image as a collection of sustainable, high-quality destinations; increasing tourism demand, from within the EU and beyond; improving the range of tourism products and services on offer; enhancing tourism quality, sustainability, accessibility, skills, and ICT use. Most attractive for tourist is Croatia and Malta. At this countries visitors stay for five days. In Spain average time of staying is four days. Poland and Germany attracts tourist for two and a half day. What is disturbing that for Poland, Spain and Croatia ratio of % of all students















(according to Mobility issue) in tertiary education is only on around 3% level. Malta and Germany has this ratio over three times higher.

In sum, recommendations for best practices of cooperation with socio-economic sector of SEA-EU countries in collective terms may be presented as follows:

- Closing gaps (areas to develop) in each sector between leaders (Germany and France) and the rest of consortium members – For Spain it will be Tourism/Mobility sector; For Poland main gaps concern Maritime and Blue Growth and Tourism/Mobility; For Croatia it is Energy and Health sector; For Malta it will be increasing potential in Energy sector and Maritime and Blue Growth;
- Supporting sectors with high developing potential: Health, Energy and Advanced technologies/High-tech/ICT for Germany and France; Maritime and Blue Growth for Spain Tourism/Mobility for Malta and Croatia; Croatia has also high developing potential in Maritime and Blue Growth;
- 3. Promoting a dialogue between SEA-EU members in closing gaps and supporting sectors with high developing potential;
- 4. Focusing policy support and investments on key national/regional priorities, challenges and needs for knowledge-based development;
- 5. For SEA-EU Universities:
 - invite stakeholders fully involved and encourage innovation and experimentation in gaps to fill in and excellence areas;
 - Including identified gaps in research agendas;
 - Including identified gaps in educational program with specific courses.















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