European Union
European Regional
Development Fund

DigiBEST
Interreg Europe

DIGIBEST STUDY ON THE STATE OF DIGITAL TRANSFORMATION AND ITS IMPACT ON THE REGIONAL BUSINESSES

JOINT REPORT

Joint Report, Version 2
Date: 01/02/2021

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Table 1. List of abbreviations used in the text

AF	Application Form
AP	Action Plan
BDRM	Business Digitalization Regional Road Map
BDTAT	Business Digital Transformation Assessment Tool (survey)
DESI	Digital Economy and Society *Index*
CV	Curriculum Vitae
EC	European Commission
eIDAS	EU regulation on electronic identification and trust services for electronic transactions in the European Single Market
EU	European Union
GP	Good Practice
ICT	Information and Communication Technologies
IE	Interreg Europe
IMF	International Monetary Fund
ITI	Integrated Territorial Investment
LU	University of Latvia
MoEPRD	Ministry for Environmental Protection and Regional Development
OECD	Organization for Economic Cooperation and Development
OP	Operational Programme
PDLP	Plan for the Development of Local Productive Activity (Spain)
PP	Project partner
PR	Peer Review
RS	Regional Studies
SH	Stakeholder
SME	Small and medium enterprise
TO	Thematic Objective

1. Introduction

The **overall objective of the DigiBEST project** is to support and promote the SMEs (small and medium enterprises) competitiveness through digital transformation of SMEs and microenterprises in rural European territories by proposing solutions to enhance their capacity to use advanced technologies and new innovative business approaches for promoting smart, sustainable and inclusive growth in Europe and its regions.

This **objective of the DigiBEST Joint Report** is to provide an insight into situation on business digitalization in the DigiBEST partners' regions and countries, especially, taking into account latest developments with the COVID19 pandemics, as well as summarize and compare findings of the RSs of the DigiBEST project (https://www.interregeurope.eu/digibest/) partners. The main objective of RS is to analyse and compare the situation on digital transformation of SMEs and microenterprises in each partner region, including analysis of statistical data and literature, mapping stakeholders, SWOT, digitalization barriers and solutions, policy analysis, analysis of good practices; as well as analysis of the Business Digital Transformation Assessment Survey (BDTAS) results. Finally, the JR provides conclusions and recommendations on the project level. The purpose of JR is to be used as a source of information for the DigiBEST Peer Reviews, as well as a source of information and inspiration for the DigiBEST partners Action Plans as it is a part of the DigiBEST interregional learning process. In addition, results and findings of this research will be communicated to the wider public, as well as presented in international conferences and other relevant events.

This report considers the **definition of digital transformation** formulated by the European Commission (EC): "Digital transformation is characterized by a fusion of advanced technologies and the integration of physical and digital systems, the predominance of innovative business models and new processes, and the creation of smart products and services." Advanced digital technologies provided in the processes of digital transformation, such as the Internet of Things, big data, advanced manufacturing, robotics, 3D printing, blockchain technologies and artificial intelligence, as well as smart use of ICT in SMEs offer businesses new opportunities for building on their competitiveness.[1]

According to the European Commission the **definition of SMEs and micro enterprises** is based on a number of employees, turnover and balance sheet:

Table 2. Main factors determining the type of an enterprise

Company category	**Staff headcount**	**Turnover**	or	**Balance sheet total**
Medium-sized	< 250	≤ 50 million EUR		≤ 43 million EUR
Small	< 50	≤ 10 million EUR		≤ 10 million EUR
Micro	< 10	≤ 2 million EUR		≤ 2 million EUR

Source: European Commission[2]

[1] Eurostat (2020), *Advanced technologies*. Retrieved from: https://ec.europa.eu/growth/industry/policy/digital-transformation_en

[2] European Commission, *SME Definition*. Retrieved from: https://ec.europa.eu/growth/smes/sme-definition_en,

The DigiBEST project started in August 2019 and its first phase will end in July 2022. The second phase of the project, which will start immediately after the first phase, will last until July 2023.

This study analyses situations in 6 DigiBEST partner regions/countries:

1. **REPUBLIC OF LATVIA** (NUTS 1), Latvia (NUTS 2)
2. **TRØNDELAG REGION** (NUTS 2), Sør-Trøndelag (NUTS 3), Norway (NUTS 1)
3. **BASILICATA REGION** (NUTS 2), Italy (NUTS 1)
4. **ANDALUCÍA** (NUTS 2), Spain (NUTS 1)
5. **REPUBLIC OF AUSTRIA** (NUTS 1)
6. **NORTE REGION** (NUTS 2), Portugal (NUTS 1), Portugal.

Altogether the project partner regions include around 23 million inhabitants and a total size of all concerned territories of around 324 000 square kilometres.

The Joint Report is prepared by the DigiBEST Advisory Partner, the University of Latvia, Centre for European and Transition Studies, based on the research results of the DigiBEST Regional reports which provide a comparative analysis, general overview of DigiBEST countries and regions, as well as define main drawbacks and opportunities for the digitalization of SMEs and microenterprises. The Joint Report has been red and approved by each of the DigiBEST partner's institutions.

The research work involves analysing quantitative and qualitative data, literature and policy documents, as well as SWOT analysis. Qualitative data have been gathered by involving in the DigiBEST BDTAT around 300 management level employees or owners of SMEs and microenterprises of the DigiBEST partner regions.

Taking into account data shortages on NUTS3 level in the Eurostat databases, in most of the cases NUTS 2 and NUTS 1 level data will be used throughout this study. The Joint Report is based on a similar methodology as Regional reports in order to ensure comparability between the DigiBEST regions. However, it should be noted that due to differences in project partners' regional classification (NUTS 1, NUTS 2, NUTS3) and availability of data the comparative analysis is only partially possible.

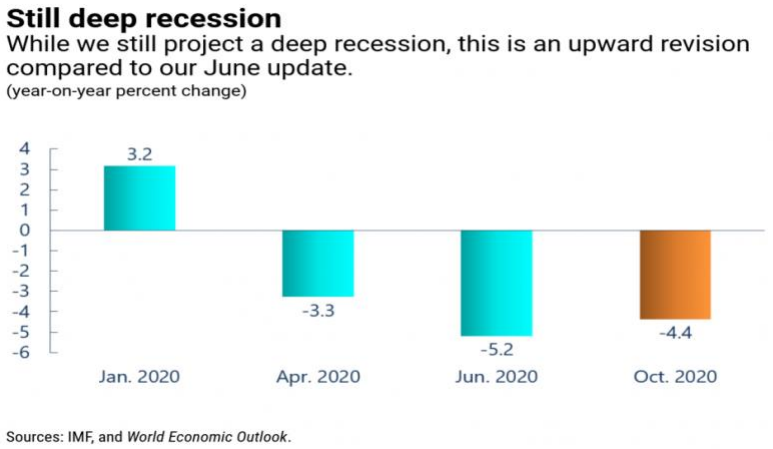
Based on the research and peer reviews undertaken during the first half of 2021, the measures defined during the first phase of the project will be reflected in the Action Plans to be implemented during the second phase of the project. The Action Plans will be elaborated together with regional stakeholders, as well as endorsed and formally approved by legally competent decision makers.

2. Literature review and current challenges

The objective of the DigiBEST project to support and promote the SMEs competitiveness through digital transformation of SMEs and microenterprises has become even more important taking into account the global spread of the COVID-19 pandemics that started during the first year of the DigiBEST implementation, and increasing significance of digital technologies. Therefore, findings and conclusions during the DigiBEST implementation should also help to find new solutions for dealing with the COVID-19 crisis and its consequences through promoting the digital transformation of SMEs and microenterprises.

The COVID-19 has impacted all countries in the World and resulted in the global economic slowdown. The International Monetary Fund (IMF) continues to project a deep recession in 2020. Global growth is projected to be -4.4%. In 2021 the world economic growth is projected to rebound to 5.2% (see Figure 1).

Figure 1. IMF projections about the global economic recession, November 2020



Source: IMF[3]

The IMF projected recession for the Euro Area in 2020 is almost twice as large as the global decline -8.3%. The economic recovery of 5.2% of the Euro Area is expected in 2021 if the COVID-19 will be combated and the situation will normalize. According to the ILO estimates, the hardest hit industries are tourism and hospitality services, followed by transportation and logistics. The least disrupted sectors include education and agriculture.[4]

The IMF calls the COVID-19 crisis the worst since the Great Depression, and it will take significant innovation on the policy front, at both the national and international levels to recover from this calamity. The challenges are daunting. But there are reasons to be hopeful. The exceptional policy response, including the establishment of the European Union pandemic recovery package fund and the use of digital technologies are a powerful reminder that well-designed policies protect people and collective economic wellbeing.[5]

The digital technology is at the centre of today's economic development debate due to its wide use during the Covid-19 outbreak. While there is no doubt that the pandemic is amplifying the adoption of new technologies, technological advancements were already changing the world over the past two decades, from living standards to the very nature of our work. Digital technology is also improving people's ability to work from home, although the amenability to remote work — which depends on the type of jobs and tasks to be done, as well as digital capacity — varies significantly across and within countries. The spread of COVID-19 pressed businesses and governments to adapt to the use of technologies very rapidly taking into account that embracing technology is no longer an option but a necessity. At the same time, there hasn't been enough flexibility or skill of SMEs and microenterprises to adapt to this new situation in 2020. To face these challenges, businesses need to embrace technology and upgrade training programs to equip their workers with the necessary skills.

[3] IMF (2020), *World Economic Outlook, October 2020: A Long and Difficult Ascent*, IMF: Washington D.C. Retrieved from: https://www.imf.org/en/Publications/WEO/Issues/2020/09/30/world-economic-outlook-october-2020

[4] ILO, (2020), *ILO Monitor: COVID-19 and the world of work. 4th edition*. Retrieved from: https://www.ilo.org/global/topics/coronavirus/impacts-and-responses/WCMS_745963/lang--en/index.htm%E2%80%8B

[5] Gopinath, G., A (2020), *Long, Uneven and Uncertain Ascent*. Retrieved from: https://blogs.imf.org/2020/10/13/a-long-uneven-and-uncertain-ascent/

The experts of the Harvard Business Review - argue that governments have an arsenal of policy options at their disposal, from incentives and regulations to infrastructure projects and taxation.[6] Key priorities should be:

1) ramping up investment in *human capital* (knowledge, skills, and health) and *lifelong learning* if workers are to adapt to future labour markets;

2) strengthening *social protections,* expanding safety net coverage, and reforming financing arrangements and labour market norms to facilitate work transitions and to reduce disincentives to the creation of formal jobs;

3) ensuring affordable access to the internet while adapting *regulations* to confront the challenges posed by digital platforms (such as data privacy and protection and competition rules); and

4) upgrading *taxation systems* to address tax avoidance and to create fiscal space for universal social protection and human capital development.

According to the COVID-19 Digital Engagement Report produced by Twilio the COVID-19 has sped up digital transformation by 5.3 years and argues that it's driving the digital.[7] The survey performed in the UK reveals that almost four in five (77%) UK companies the COVID-19 has increased their budget for digital transformation, of which 36%, more than any other country surveyed, said that it increased 'dramatically'. COVID-19 propelled some industries further than others. Those accelerating their digital transformation most significantly in response to COVID-19 were tech companies (78%), followed by energy (77%), healthcare (74%), construction (71%) and retail (70%). Notably, however, the greatest acceleration in digital communications has been seen by construction businesses (8.1 years) and energy (7.2 years), while retail and e-commerce organizations report an average acceleration of 6.1 years. Almost all (99%) of businesses surveyed agreed that digital technologies will open up a future of continued remote work. Four in five tech companies answered 'definitely yes' (80%), while for retail and healthcare businesses it was 69%, energy 68%, construction 65%, manufacturing and automotive 63% and professional services 62%. Finance was the least definite on this move, at 60%. Almost all global companies (95%) are seeking new ways of engaging customers as a result of COVID-19. 92% say transforming digital communications is extremely or very critical to address current business challenges.

Research findings of the Nordea bank suggest that despite COVID-19, few companies are shelving digital transformation projects, while many are accelerating their efforts.[8] The main challenge was supporting the dramatic acceleration of remote working and growth of e-commerce, but overall technology hasn't been a major problem for businesses. At the same time others (Dannenberg P. et al., 2020) argue that the COVID-19 pandemic has led to a sharp increase in online trade, especially, in the retail sector.

One of the reasons why some companies during the COVID-19 pandemics have frozen their digital transformation projects could be related to the digitalization paradox explained by the German scientists.[9] They argue that despite the demonstrated opportunities for revenue enhancement through digitalization, companies often experience a digitalization paradox, which suggests that although companies invest in digitalization, they often fail to achieve the expected revenue enhancement.

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[6] Saliola, F., Islam, A. M. (2020), *How to Harness the Digital Transformation of the Covid Era*. Retrieved from: https://hbr.org/2020/09/how-to-harness-the-digital-transformation-of-the-covid-era

[7] Iotnow (2020), *COVID-19 has sped up digital transformation by 5.3 years.* Retrieved from: https://www.iot-now.com/2020/07/23/104031-covid-19-has-sped-up-digital-transformation-by-5-3-years-says-study/

[8] Nordea (2020), *Post COVID-19: What next for digital transformation?* Retrieved from: https://insights.nordea.com/en/business/post-covid-19-what-next-for-digital-transformation/

[9] Gebauer, H., Fleisch, E., Lamprecht, C., & Wortmann, F. (2020), *Growth paths for overcoming the digitalisation paradox. Business Horizons.* Retrieved from: https://doi.org/10.1016/j.bushor.2020.01.005

At the same time the COVID-19 pandemic has stopped all doubts about the necessity of digital transformation to business longevity. It has shifted the majority of interactions with customers and employees to virtual reality and operating digitally has become the only possibility to stay in business through shutdowns and restricted activity.

Current digitization strategies typically focus on increasing productivity of a company. However, maintaining productivity is equally important during the COVID-19 pandemics. A robust technical infrastructure and end-to-end digital processes ("paper-less") are key elements to safeguard productivity during disastrous events. First-response actions such as implementing business continuity plans and stabilization of business operations should be accompanied by proactive measures:

companies should rethink and accelerate their digitization strategy to increase resilience and optimize business processes at the same time. Contractual arrangements with IT service providers should be revisited, data privacy and security topics as well as industry-specific regulations must be kept in mind.[10] Using their current experience, SMEs and microenterprises will be able better prepare for the future challenges.

The study performed in Northern Italy clearly points to the fact that the exploration of digital transformation possibilities is going to be accelerated by the challenges posed by the pandemic. About 57% of the respondents claimed that their innovation initiatives related to the introduction of new service technologies and the development of new digital services will be highly or very highly accelerated by the pandemic. However, firms have achieved different levels of digitalization. In fact, numerous respondents said they are still completing the introduction of consolidated service management technologies such as CRM systems, ticketing management, and help desk and troubleshooting applications. At the same time, another large subsample reported that they were involved in introducing digital technologies such as industrial internet, product remote control, and predictive maintenance, which are key features of digital transformation. Conversely, only a minority of the respondents claimed to be engaged in experimenting with digital breakthroughs for advanced virtual collaboration in field operations (e.g., augmented or virtual reality) or for digitizing spare parts logistics (e.g., 3D printing). The managers also reported that the adoption of these latter technologies would not experience acceleration due to the crisis. Hence, higher levels of acceleration of digitalization projects are mainly related to technologies that are closely linked to the development of advanced service and digital offerings (e.g., connected products and data valorisation, diagnostic and preventive maintenance, CRM, and ticketing and troubleshooting to provide remote).[11]

According to the estimates of Canadian researchers, 41% of jobs can be done from home digitally.[12] When weighted by wages, this percentage increases to 51%. The higher estimate when weighting by wages indicates that higher-wage jobs tend to be associated with jobs that can be more easily performed remotely. Also, the estimate of the percentage of jobs that can be done digitally at home in the United States is 37%.[13] These estimates are consistent with the international evidence. The current shift of businesses to digital environments isn't just a short-term phenomenon. It has also shown that part of businesses can efficiently and safely operate virtually with lower costs. There will be no business as usual even after the COVID-19 calms down. Taking into account that the crisis will

[10] Deloitte.Legal (2020), *Accelerate digitization to increase resilience. A global COVID-19 response for legal leaders*. Retrieved from: https://www2.deloitte.com/content/dam/Deloitte/global/Documents/Legal/dttl-legal-covid-respond-legal-digitization.pdf

[11] Rapaccini, M., Saccani, N., Kowalkowski, C., Paiola, M., Adrodegari, F. (2020), *Navigating disruptive crises through service-led growth: The impact of COVID-19 on Italian manufacturing firms*. Industrial Marketing Management, 88, 225-237. Retrieved from: https://www.sciencedirect.com/science/article/pii/S0019850120304247

[12] Gallacher, G., Hossain, I. (2020), *Remote work and employment dynamics under COVID-19: Evidence from Canada*. Canadian Public Policy, 46(1), 44-54. Retrieved from: https://www.utpjournals.press/doi/full/10.3138/cpp.2020-026

[13] Dingel, J.I., and B. Neiman. (2020), *"How Many Jobs Can Be Done at Home?"* NBER Working Paper No. 26948. Cambridge, MA: National Bureau of Economic Research. Retrieved from: https://www.nber.org/papers/w26948

still be ongoing this is an ideal time for digital transformation of SMEs and microenterprises to prepare for future challenges.

The five key messages of the OECD Digital Economy Outlook 202 published in November 2020 are:

- The COVID-19 pandemic has amplified all aspects of the digital transformation, and digital tools have enabled many economies to avoid a complete standstill during shutdowns.
- Governments are increasingly putting the digital transformation front and centre of national policy agendas.
- Connectivity continues to improve in OECD countries, but important digital divides remain – across and within countries, industries and demographics.
- COVID-19 has raised the bar for what is considered "acceptable" connectivity, and the crisis may open new divides – now is the time to step up and do more.
- Big data creates new opportunities for businesses and consumers, and new challenges for security and privacy.[14]

3. General overview: economic development, entrepreneurship and digitalization level of DigiBEST project partners

This part describes the general economic situation and stage of digitalization of the DigiBEST project partners based on the statistical analysis, as well as the analysis of literature and documents. Because of the project specifics two of its partners – Latvia and Austria have the data on NUTS 1 level, while four other partners – Andalucía (Spain), Trøndelag (Norway), Norte (Portugal) and Basilicata (Italia) use the data on NUTS 2 level. The analysis on the stage of digitalization is based on the DESI index, which is provided on the national (NUTS 1) level only.

This comparative analysis has a particular data shortage taking into account that data on the GDP per capita wasn't available for Andalucía, Norte and Basilicata regions for 2019 and in a case of Trøndelag region – for 2018 and 2019; data on the real GDP growth for 2019 wasn't available in cases of Andalucía and Trøndelag regions; data on the GDP in PPS per inhabitant wasn't available for Andalucía, Trøndelag, Norte and Basilicata regions for 2018 and 2019. Data on the distribution of enterprises and employment per size of enterprise was available only until 2017 in cases of all DigiBEST partners' regions/countries; the data on the employment per size of enterprise wasn't available for the Trøndelag region at all.

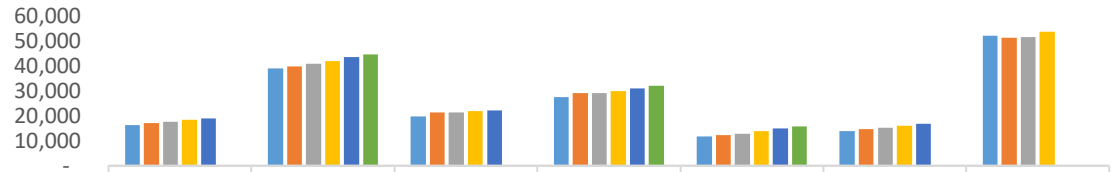
3.1 Economic development and entrepreneurship

3.1.1 Gross Domestic Product

During the six years' period (2014-2019), the GDP per capita in the DIGIBEST project partner regions has shown an upward going trend. The average GDP per capita for 28 European Union countries in 2018 reached EUR 31 000. At the same time, only two of the project partners – Austria (EUR 43 600) and Trøndelag (EUR 53 800, 2017) have experienced notably higher GDP per capita, while four others have had lower than EU-28 average GDP per capita – Andalucía (EUR 19 100), Latvia (EUR 15 100), Norte (EUR 16 900) and Basilicata (EUR 22 300) (please, see Figure 2).

[14] OECD (2020), *OECD Digital Economy Outlook 2020*. Retrieved from: http://www.oecd.org/publications/oecd-digital-economy-outlook-2020-bb167041-en.htm?utm_source=Adestra&utm_medium=email&utm_content=deo-report&utm_campaign=What%27s%20New%20-%2027%20Nov%202020&utm_term=pac

Figure 2. GDP per capita at current market prices (2014-2019), EUR

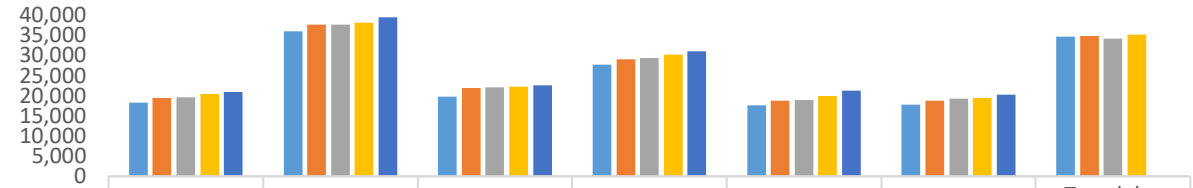


	Andalucía (ES)	Austria (AT)	Basilicata (IT)	EU28	Latvia (LV)	Norte (PT)	Trøndelag (NO)
2014	16,400	39,000	19,700	27,700	11,900	14,000	52,200
2015	17,200	39,900	21,500	29,100	12,400	14,600	51,300
2016	17,700	40,900	21,500	29,300	12,800	15,300	51,600
2017	18,500	42,100	21,900	30,100	13,800	16,100	53,800
2018	19,100	43,600	22,300	31,000	15,100	16,900	-
2019	-	44,780	-	32,020	15,920	-	-

Source: Eurostat[15]

The GDP per capita in the Purchasing Power Standards (PPS)[16] In Figure 3 shows a similar trend that the real GDP comparison in Figure 2. However, the GDP per capita adjusted by the PPS reveals that the difference between the DigiBEST partner regions/countries GDP per capita is smaller and more evenly distributed.

Figure 3. GDP per capita in PPS (2014-2018)



	Andalucía (ES)	Austria (AT)	Basilicata (IT)	EU 28	Latvia (LV)	Norte	Trøndelag (NO)
2014	18,300	36,000	19,700	27,700	17,600	17,800	34,700
2015	19,500	37,600	21,900	29,100	18,700	18,800	34,800
2016	19,600	37,600	22,000	29,300	18,900	19,200	34,100
2017	20,400	38,100	22,200	30,100	19,900	19,500	35,200
2018	20,900	39,400	22,600	31,000	21,300	20,200	-

Source: Eurostat[17]

Using the GDP per capita in the Purchasing Power Standards the difference between GDP per capita in the DigiBEST partners' regions/countries and the EU-28 average is even more visible, when the GDP per capita is being measured in PPS. It indicates that annual changes in DigiBEST partners' regions/countries GDP per capita during the period (2014-2018) have been minor, but the difference in the GDP per capita of two partners – Austria and Trøndelag with the EU-28 average has been decreasing. In the case of Austria, the GDP per capita difference with the EU-28 average level decreased from 32% in 2014 to 28% in 2018, while in the case of Trøndelag the GDP per capita

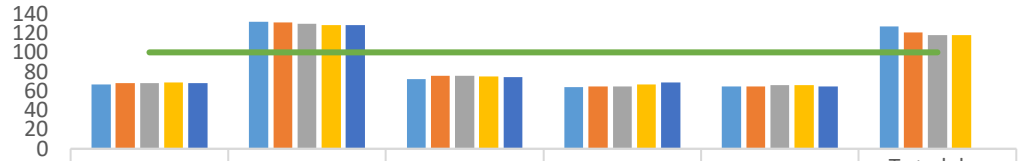
[15] Eurostat (2020), *Regional gross domestic product (PPS per inhabitant) by NUTS 2 regions.* Retrieved from: https://ec.europa.eu/eurostat/databrowser/bookmark/0ba2f38c-59f9-4289-ba9c-55b8ea3e2187?lang=en, viewed on 13.01.2021

[16] PPS uses a common currency that eliminates the differences in price levels between countries allowing meaningful volume comparisons of GDP between countries.

[17] Eurostat (2020), *Regional gross domestic product (PPS per inhabitant) by NUTS 2 regions*. Retrieved from: https://ec.europa.eu/eurostat/databrowser/bookmark/0ba2f38c-59f9-4289-ba9c-55b8ea3e2187?lang=en , viewed on 13.01.2021

difference with the EU-28 average level decreased from 27% in 2014 to 18% in 2017 (please, see Figure 4).

Figure 4. GDP per capita in PPS (% from European average)



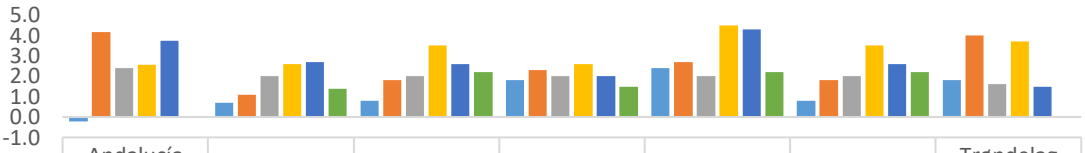
	Andalucía (ES)	Austria (AT)	Basilicata (IT)	Latvia (LV)	Norte (PT)	Trøndelag (NO)
2014	67	132	72	64	65	127
2015	68	131	76	65	65	121
2016	68	130	76	65	66	118
2017	69	128	75	67	66	118
2018	68	128	74	69	65	-
EU 27 level	100	100	100	100	100	100

Source: Eurostat[18]

The real GDP growth rate that measures the GDP change compared with the previous year indicates that there were considerable year by year changes during the period of time from 2014 to 2019. The overall trend in DigiBEST partners' regions/countries shows that the economic growth has been lower in 2014 reaching top levels in 2017 and/or 2018. Lower economic growth is quite typical for the EU countries in the beginning of the EU Structural Funds programming period (2014-2020) reaching up in the following years, when the absorption of the EU funding resources starts. This pattern is also reflected by DigiBEST partners' regions/countries GDP growth rates. While this isn't the case of Norway, GDP growth rate shows similar shifts by increasing 4% in 2015 after slower GDP growth in 2014 (1.8%) then dropping again to 1.6% in 2013 and then rising by 3.7% in 2018 (please, see Figure 5).

During the period of time from 2014 to 2018 the highest average GDP growth among the DigiBEST partners' regions/countries was achieved by Latvia (3.18%), which was higher than the EU-28 average GDP growth (2.14%) during the same period.

Figure 5. Real GDP growth (2014-2019), % change



	Andalucía (ES)	Austria (AT)*	Basilicata (IT)	EU 28	Latvia (LV)	Norte (PT)	Trøndelag (NO)
2014	-0.2	0.7	0.8	1.8	2.4	0.8	1.8
2015	4.2	1.1	1.8	2.3	2.7	1.8	4.0
2016	2.4	2.0	2.0	2.0	2.0	2.0	1.6
2017	2.6	2.6	3.5	2.6	4.5	3.5	3.7
2018	3.7	2.7	2.6	2.0	4.3	2.6	1.5
2019	-	1.4	2.2	1.5	2.2	2.2	-

Source: Compiled from DigiBEST partners Regional Studies

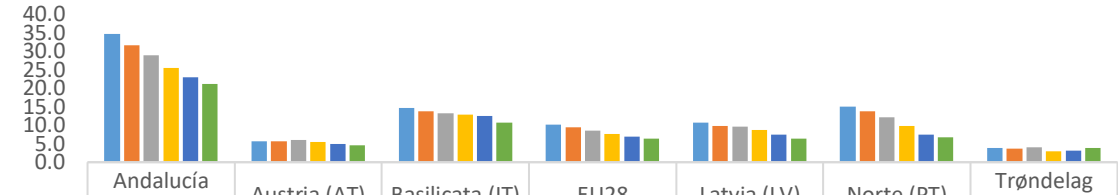
[18] Eurostat (2020), *Regional gross domestic product (PPS per inhabitant in % of the EU27 (from 2020) average) by NUTS 2 regions*, Retrieved from: https://ec.europa.eu/eurostat/databrowser/bookmark/468fc037-be84-4ae9-9736-228ac99f8f04?lang=en , viewed on 12.12.2020

The economic growth is experiencing slowdown in 2020 due to the COVID-19 pandemic crisis all over the World. This is expected that the economic recovery will start in 2021 and the growth rates will return to positive indicators in all DigiBEST partner countries. The forecast indicates that the EU average GDP growth will decrease by (-7.4%) in 2020 and will recover to 4.1% in 2021.[19] Please, find out more about the development of COVID-19 crisis, support measures and funding, as well as forecasts for the GDP growth in 2020 and 2021 in the DigiBEST partner countries in Part 3.1.4.

3.1.2 Unemployment

During the six years' period (2014-2019), the average unemployment rate in the EU-28 has decreased from 10.2% in 2014 to 6.3% in 2019. The unemployment rate has declined in the case of all DigiBEST partner regions/countries, although, the unemployment indicators varied a lot. The highest unemployment rates have been in the Andalucía region during the whole period reducing from 34.7% in 2014 to 21.2 in 2019. The lowest unemployment rates have been in the Trøndelag region – 3.8% in 2014 and 2019 with small shifts in between the period (2014-2019). The unemployment rates have been reducing in all DigiBEST partners' regions/countries during the period (2014-2019), except Norway, where the unemployment rate has remained stable and low (please, see Figure 6.)

Figure 6. Unemployment in partners' regions and EU-28 (15-74), %



	Andalucía (ES)	Austria (AT)	Basilicata (IT)	EU28	Latvia (LV)	Norte (PT)	Trøndelag (NO)
2014	34.8	5.6	14.7	10.2	10.8	15.0	3.8
2015	31.6	5.7	13.7	9.4	9.9	13.8	3.7
2016	28.9	6.0	13.3	8.6	9.6	12.2	4.0
2017	25.5	5.5	12.8	7.6	8.7	9.8	2.9
2018	23.0	4.9	12.5	6.9	7.4	7.4	3.1
2019	21.2	4.5	10.8	6.3	6.3	6.7	3.8

Source: Eurostat[20]

The COVID-19 pandemic crisis in 2020 has resulted in increased unemployment levels all over the EU and beyond. This has been forecasted that the average unemployment rate in the EU is forecasted to rise up to 7.7% in 2020 and 8.6% in 2021, before starting declining to 8.0% in 2022. According to the European Commission's report (European Commission, 2020), in the case of Austria, the forecasted unemployment rate in 2020 is 5.5% and in 2021 – 5.1%; Italy – 9.9% (2020) and 11.6 (2021); Latvia – 8.3% (2020) and 8.0 (2021); Norway – 5% (2020) and 3.3% (2021); Portugal – 8.0% (2020) and 7.7% (2021); Spain – 16.7% (2020) and 17.9% (2021).

3.1.3 Business development

In 2018, there were slightly more than 25 million SMEs in the EU-28, of which 93% were microenterprises. These SMEs and microenterprises accounted for 99.8% of all enterprises in the EU-28 non-financial business sector, generating 56.4 % of value added and 66.6% of employment. Based

[19] European Commission (2020), *European Economic Forecast. Autumn 2020, Luxembourg: Publications Office of the European Union, 2020, p.1*. Retrieved from: https://ec.europa.eu/info/sites/info/files/economy-finance/ip136_en_2.pdf

[20] Eurostat (2020), *Unemployment rates by sex, age and NUTS 2 regions (%)*. Table: LFST_R_LFU3RT. Retrieved from: https://ec.europa.eu/eurostat/databrowser/bookmark/578ff1bb-650a-4fa7-88b2-32b31851a950?lang=en , viewed on 21.12.2020

on a spring 2019 forecast, EU SME value added is predicted to grow by 4.1% in 2019 and 4.2% in 2020, while EU SME employment is expected to grow by 1.6% in 2019 and 1.4% in 2020. However, the economic outlook has weakened since this forecast, so this growth may have to be revised downwards.[21]

According to the distribution of enterprises in the DigiBEST partners' regions/countries, the majority of enterprises in 2017 were microenterprises. The greatest shares of microenterprises were in Latvia, where microenterprises represented 94% (164 708) of all enterprises; Andalucía region, where microenterprises represented 92% (227 189) of all enterprises; and Basilicata region, where microenterprises were also 92% (12 432) of all enterprises. At the same time the greatest share of SMEs (with 10 to 250 persons employed) was in the Trøndelag region, where SMEs represented 23% (2 503) of all enterprises (please, see Figure 7).

Figure 7. The distribution of total active enterprises by partner regions in 2017[22]

Source: Eurostat[23]

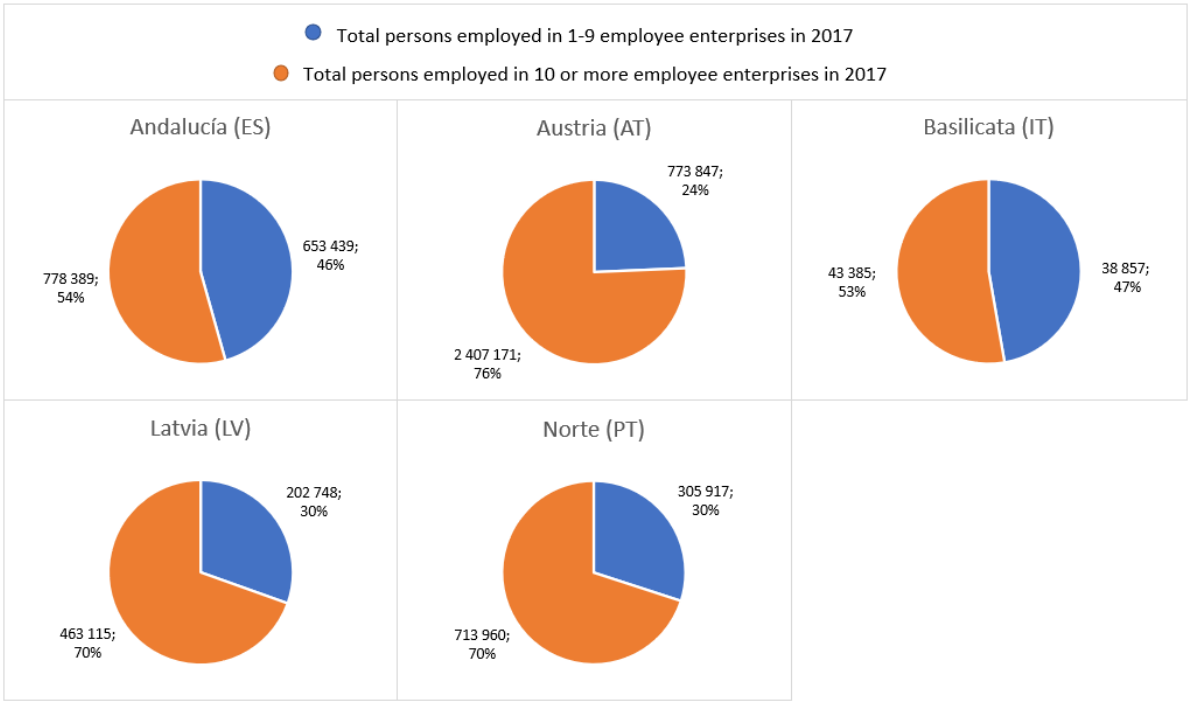
In terms of employment SMEs played a greater role than microenterprises in all DigiBEST partners' regions/countries, except Latvia, where the employment by SMEs takes only 25% and 75% by microenterprises, in 2017. In the Andalucía and Basilicata regions employment is almost equally distributed between SMES and microenterprises. In Austria and the Norte region, most people are employed by SMEs. Unfortunately, there was no data available for the Trøndelag region in 2017 for this data set. (Please, see Figure 8.)

[21] IMF (2020), *Policy responses to COVID-19*. Retrieved from: https://www.imf.org/en/Topics/imf-and-covid19/Policy-Responses-to-COVID-19

[22] According to the Eurostat the data for all regions/countries, except for Latvia, is provided in two categories: 1) enterprises with 1 to 9 employees; 2) enterprises with 10 or more employees. Therefore, the data for SMEs may also include large private enterprises (250 employees and more). In addition, the Eurostat data sets, except for Latvia, used for this analysis include enterprises involved in industry, construction and services except insurance activities for holding companies, which may exclude private companies involved in other types of economic activities.

[23] Eurostat (2020), *Business demography by size class and NUTS 3 region*. Table: BD_SIZE_R3. Retrieved from: https://ec.europa.eu/eurostat/databrowser/bookmark/b0b9b22e-f107-4229-b3bb-a3a19b61f0f5?lang=en, viewed on 27.12.2020

Figure 8. The distribution of persons employed by the enterprise size, 2017[24]



Source: Eurostat[25]

3.1.4 The impact of COVID-19 on the DigiBEST partner countries and support measures

The impact of the COVID-19 on the DigiBEST partner countries, support measures and funding allocated to deal with consequences of this crisis, as well as forecasted GDP growth rates in 2020 and 2021 are reflected in Table 3.

Table 3. Summary of partner country policy responses to COVID 19

Country	***Development of the Covid-19 crisis***	***Support measures and funding***	***Forecasted GDP growth, %***	
			2020	***2021***
LATVIA	Latvia reported its first COVID-19 case on March 2, 2020. The new cases have decreased since the peak in March, but since the end of September, the signs of a second wave have been appearing. The government imposed strict containment measures after declaring a state of emergency. The state of	The government has announced a support package of about 3.4 billion EUR (12% of projected 2020 GDP). Financing includes: • 1.2 billion EUR loans and guarantees for business amounting to, a sectoral support package of 875 million EUR covering the air and transport industry, health and	-6.0	5.2

[24] According to Eurostat the data for all regions/countries, except for Latvia, is provided in two categories: 1) enterprises with 1 to 9 employees; 2) enterprises with 10 or more employees. Therefore, the data for SMEs may also include large private enterprises (250 employees and more). In addition, the Eurostat data sets, except for Latvia, used for this analysis include enterprises involved in industry, construction and services except insurance activities for holding companies, which may exclude private companies involved in other types of economic activities.

[25] Eurostat (2020), *Business demography by size class and NUTS 3 region*. Table: BD_SIZE_R3. Retrieved from: https://ec.europa.eu/eurostat/databrowser/bookmark/b0b9b22e-f107-4229-b3bb-a3a19b61f0f5?lang=en, viewed on 27.12.2020

	emergency ended on June 10 with new laws regulating COVID-19 recovery in force. An extraordinary government meeting has been convened for November 6, 2020, to decide on declaring again a State of Emergency. The Q3-2020 year-on-year real GDP growth was -3.1%.	education sectors as well as infrastructure projects, EU funds amounting to about 763 million EUR to mitigate the impact of the COVID-19 crisis and other actions. • 331 million EUR revenue measures amounting; • 196 million EUR expenditure measures supporting idle workers and social benefits; • The government will also contribute 50 million EUR to the 100 million EUR investment funds established to support large enterprises affected by the crisis.		
NORWAY	The first confirmed COVID-19 case was reported on February 26, 2020. The virus continued to spread, with the number of new cases reaching its peak at the end of March. On May 7, 2020, the government announced its plan to reopen the economy, with a gradual timeline that remains dependent on keeping the spread of infection under control.	Key implemented and proposed fiscal measures (discretionary measures close to NOK 126.3 billion, or 4.2% of 2020 mainland GDP) include: • household income protection; • measures for business offering a scheme to compensate heavily affected but otherwise sustainable businesses; • strengthening of critical sectors such as healthcare; • guarantee and loan schemes for businesses which include loan guarantees for SMEs, and a scheme for re-insurance of private credit insurance providers.	-2.8	3.6
ITALY	The first two cases of the new coronavirus (COVID-19) in Italy were recorded between the end of January and the beginning of February 2020. On 9 March 2020, the government of Italy imposed a national quarantine. The nation-wide lockdown expired on May 4. People can travel within their own region, and mobility restrictions across regions has been lifted on June 3, when international borders also reopen without restriction to and from other EU countries. Net inflows of COVID-19 cases have been	On March 17, 2020, the government adopted a 25 billion EUR (1.6% of GDP) "Cura Italia" emergency package. Financing includes • 3.2 billion EUR in funds to strengthen the Italian health care system and civil protection; • 10.3 billion EUR measures to preserve jobs and support income of laid-off workers and self-employed; • billion EUR in other measures to support businesses, including tax deferrals and postponement of utility bill payments in most affected municipalities; • 5.1 billion EUR to support credit	-10.6	5.24

	back on the rise. As of November 3, 2020, the number of active cases has increased to about 28 000, number of hospitalized patients and those in intensive care units is increasing slowly	supply. On April 6, 2020, the Liquidity Decrees allowed for additional state guarantees of up to 400 billion EUR (25% of GDP). The guarantee envelope from this and earlier schemes is aimed to unlock more than 750 billion EUR (close to 50% of GDP) of liquidity for businesses and households.		
SPAIN	Spain has been heavily affected by the COVID-19 outbreak, with the first infection case detected on February 25, 2020. After a steady decline from April through mid-July, the daily new infection numbers are surging again, surpassing the previous peaks. The first state of emergency was lifted on June 21, allowing for unconstrained mobility across all provinces and reopening of EU borders. The government declared a new state of emergency on October 25, initially for 15 days and then extended it until May 9, 2021 with an option of lifting it in four months depending on the epidemiological developments.	About 3.8 % of GDP, 42 billion EUR, subject to changes in the usage and duration of the measures include: • 1.4 billion EUR budget support from the contingency fund to the Ministry of Health; • 2.9 billion EUR advance transfer to the regions for the regional health services; • 134 million EUR additional healthcare related spending including research related to COVID-19; • 18 billion EUR (at least) depending on the duration unemployment benefit for workers temporarily laid off; • About 5½ billion EUR depending on the duration benefit for self-employed workers; • 1.4 billion EUR sick pay for COVID-19 infected workers or those quarantined; • About 3 billion EUR annually for introduction of a new means-tested "Minimum Income Scheme".	-12.8	7.2
AUSTRIA	End-November 2020: daily new cases have surpassed the previous peak with the effective reproductive rate of above 1, although the fatality rate remains low. A pickup in the infection rate has prompted the authorities to tighten containment measures, including reintroducing mandatory masks since July. The authorities eventually	The total fiscal package announced on March 15, 2020, amounts to 38 billion euros (about 9.5 % of 2019 GDP). On June 16, the package was increased to 50 billion EUR (13 % of GDP). Financing includes: • 4 billion EUR for the health care; • 9 billion EUR in guarantees to companies, including exporters and the tourism industry; • 10 billion EUR for the deferral of	-6.72	4.65

	announced a 4-week partial lockdown effectively on November 3, 2020.	personal and corporate income taxes (for 2020); • 12 billion EUR for short-term work and other activities; • 500 million EUR in tax relief measures for hospitality sector; • 700 million support to non-profit organizations open for 6 months.		
PORTUGAL	The first confirmed COVID-19 case was reported on March 2, 2020. The economy has been significantly affected by the pandemic, with a second-quarter GDP decline of 16.3% from the previous year. However, the recent intensification of the virus outbreak has led to progressive reinforcement of social distancing rules and limitations on economic activity	Key fiscal measures in 2020 include: • additional resources for virus-related health and education spending: over 600 million EUR per month (0.3% GDP) in financial support for those temporarily furloughed by their employer (about 1.3 billion EUR equivalent to approximately 0.6% of GDP); • up to 13 billion EUR (6.8% GDP) of state-guaranteed credit lines for medium, small and micro enterprises; • 7.9 billion EUR (3.7% GDP) of tax and social security contribution deferrals for companies and employees.	-10.6	6.5

Source: IMF[26] [27]

3.2 Digital economy and society

This chapter analysis the stage of digitalization and readiness for digital transformation of each DigiBEST partner region/country and is based on the Eurostat regional statistics and the Digital Economy and Society Index (DESI)[28].

3.2.1 Developments of the EU digitalization strategy during 2020

In February 2020, the European Commission set out its vision for the digital transformation in the communication "Shaping Europe's digital future" to deliver an inclusive use of technology that works

[26] IMF (2020), *Policy responses to COVID-19*. Retrieved from: https://www.imf.org/en/Topics/imf-and-covid19/Policy-Responses-to-COVID-19, 04.11.2020

[27] IMF (2020), *World Economic Outlook, October 2020: A Long and Difficult Ascent*. Retrieved from: https://www.imf.org/en/Publications/WEO/Issues/2020/09/30/world-economic-outlook-october-2020

[28] The Digital Economy and Society Index (DESI) is a composite index that summarises relevant indicators on Europe's digital performance and tracks the evolution of EU Member States in digital competitiveness.

for people and respects EU fundamental values.[29] The White Paper on Artificial Intelligence[30] and the European data strategy[31] are the first two pillars of the new digital strategy of the Commission.

On 10 March, the EC published its new SME strategy for a sustainable and digital Europe.[32] DESI index will be used to monitor progress on the digitization of SMEs on an annual basis.[33]

In response to the COVID-19 pandemic crisis the EC has launched several measures to promote digitalization. Among the most significant were:

- The initiative to set up a special reporting mechanism to monitor the internet traffic situation in each Member State to be able to respond to capacity issues launched on 25 March 2020 between the EU and European Regulators of Electronic Communications (BEREC) to collect ideas about deployable AI and robotics solutions as well as information on other initiatives that could help respond to the pandemic.
- A recommendation to develop a common EU approach for the use of mobile applications and mobile data in response to the coronavirus pandemic (8.04.2020).
- The EC adopted the Next Generation EU recovery plan to provide Member States with the funds to make their economies more resilient (27.05.2020). This is expected to ensure that these investments and reforms focus on the challenges related to the green and digital transitions. Member States will design their own tailored national recovery plans, based on the investment and reform priorities identified as part of the European Semester to be supported by the new 560 billion EUR strong Recovery and Resilience Facility.

3.2.2 DESI 2020 ranking

The DESI 2020 reports are based on 2019 data and assesses the status of the digital economy and society prior to the pandemic. The current crisis is having an important impact on key societal indicators, relating to the use of internet services by citizens. This does not show in the latest 2019 official statistics as reported in DESI. Consequently, the DESI 2020 findings need to be read in conjunction with the large number of measures in digital taken by the Commission and the Member States to manage the pandemic and to support the economic recovery. Member States took immediate actions to minimise contagion and to support the health system, such as developing applications and platforms to facilitate telemedicine and to coordinate health resources. Measures to reinforce the digital infrastructure due to the strained demand were put in place. In many cases, the provision of online education resources and digital public services were developed or improved to promote digital inclusion. Likewise, the support to digitisation of businesses, particularly of SMEs, was accelerated in areas such as e-commerce, teleworking or online training. Cybersecurity and the fight against fake news or online shopping scams was also a priority. Efforts also concentrated on the promotion and funding of research activities using advanced digital technologies and infrastructure).[34]

[29] European Commission (2020), *Shaping Europe's digital future (COM(2020) 67 final)*. Retrieved from: https://ec.europa.eu/info/sites/info/files/communication-shaping-europes-digital-future-feb2020_en_3.pdf

[30] European Commission (2020), *White Paper on Artificial Intelligence - A European approach to excellence and trust*, COM(2020) 65 final. Retrieved from: https://ec.europa.eu/info/sites/info/files/commission-white-paper-artificial-intelligence-feb2020_en.pdf

[31] European Commission (2020g*): A European strategy for data, COM(2020) 66 final*. Retrieved from: https://ec.europa.eu/info/sites/info/files/communication-european-strategy-data-19feb2020_en.pdf

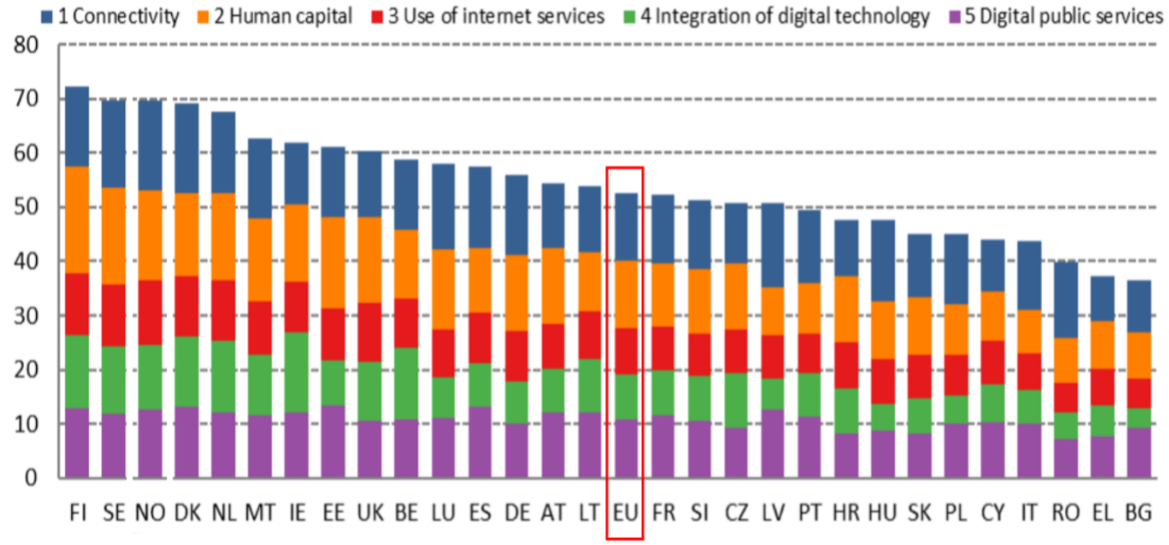
[32] European Commission (2020), *An SME Strategy for a sustainable and digital Europe, COM(2020) 103 final*. Retrieved from: https://ec.europa.eu/info/sites/info/files/communication-sme-strategy-march-2020_en.pdf

[33] European Commission (2020), *The Digital Economy and Society Index (DESI) 2020*. Retrieved from: https://ec.europa.eu/newsroom/dae/document.cfm?doc_id=67086

[34] Ibid

According to the DESI2020, the most significant progression among the EU Member States is noted in Ireland, followed by the Netherlands, Malta and Spain. These countries also perform well above the EU average as measured by the DESI score. Finland and Sweden are amongst the leaders in overall performance in digital, but in terms of progression over the last five years they are just slightly above average, together with Belgium and Germany.[35] While Denmark, Estonia and Luxembourg show a relatively low progression in digitization over the last five years, they remain amongst the well performing Member States in the overall DESI ranking. In Denmark, the largest challenge is to further improve on advanced digital skills whilst in Luxembourg the digitization of businesses is relatively low. In Estonia, there is a relative weakness as regards connectivity and the digitization of businesses. Significantly, the majority of the countries, which are below the EU average in the level of digitization have not progressed much in the last five years. This is the case notably for Bulgaria, Greece and Romania. All these Member States, however, have recently launched several initiatives in the various areas monitored by the DESI and results may be visible in the coming years[36] (please, see Figure 9).

Figure 9. Digital Economy and Society Index (DESI) 2020 ranking[37]



Sources: Eurostat[38]

From the perspective of the DigiBEST project partners' countries, Norway is an absolute leader in overall performance in digital. Norway, as well as Spain and Austria perform above the EU average, while Latvia, Portugal and Italy are below the EU digital average (please, see Figure 9 and Table 4).

3.2.3 DESI five dimensions

DESI measures the performance of countries in a wide range of areas, from connectivity and digital skills to the digitization of businesses and public services. The comparison of the DESI and its five dimensions among the DigiBEST partners' countries shows that Norway is a leader in four DESI dimensions – connectivity; human capital and digital skills; use of internet services of citizens and

[35] DESI 2020 includes the 27 Member States of the EU and also the UK, since the latest data used in the report refer mainly to 2019, when the UK was still a member of the EU. EU averages include also the UK.

[36] European Commission (2020), *An SME Strategy for a sustainable and digital Europe, COM(2020) 103 final*. Retrieved from: https://ec.europa.eu/info/sites/info/files/communication-sme-strategy-march-2020_en.pdf

[37] The DESI 2020 reports are based on 2019 data. The United Kingdom is still included in the 2020 DESI, and EU averages are calculated for 28 Member States. The DESI was re-calculated for previous years to reflect the changes in the choice of indicators and corrections made to the underlying data. The scores and rankings may thus have changed compared with previous editions.

[38] European Commission (2020*), shaping Europe's digital future – Norway*. Retrieved from: https://ec.europa.eu/digital-single-market/en/scoreboard/norway

integration of digital technology by businesses, while Spain is a leading country in the DESI dimension of digital public services (please, see Table 4).

Table 4. DESI and 5 dimensions, **rank**/score (max 100), 2020

Indicators (2020)	Latvia	Norway*	Italy	EU	Spain	Austria	Portugal
DESI Index	**18**/50.7	n/a/69.5	**25**/43.6	52.6	**11**/57.5	**13**/54.3	**19**/49.6
DESI: connectivity	**4**/61.8	n/a/65.8	**17**/30	50.1	**5**/60.8	**22**/47.2	**12**/53.9
DESI: human capital/digital skills	**24**/35	n/a/65.9	**28**/32.5	49.3	**16**/47.6	**9**/56.7	**21**/37.8
DESI: use of internet services by citizens	**19**/54	n/a/80.6	**26**/44.5	58.0	**11**/60.8	**18**/54	**24**/48.1
DESI: integration of digital technology by business	**23**/28.3	n/a/59	**22**/31.2	41.4	**13**/41.2	**17**/40.6	**16**/40.9
DESI: digital public services	**5**/85.1	n/a/84.9	**19**/67.5	72.0	**2**/87.3	**8**/80.8	**13**/75.1

Source: European Commission[39]

* While not the EU member, Norway isn't included in the EU ranking. However, being a part of the EU digital single market, through the EEA Agreement and, it's being ranked by DESI.

Despite a very good or relatively good performance of the DigiBEST partners' countries' DESI or its five dimensions, a comparative analysis of strengths and weaknesses reveals that all countries experience weaknesses in the DESI dimension – integration of digital technology by business or digitization of businesses, where scores are from 31.2 in case of Italy to 59 in case of Norway. The strongest DESI dimension for all DigiBEST partner countries is in the digital public services. The summary of main strengths and weaknesses identified by DESI is provided in Table 5.

Table 5. Summary of main strengths and weaknesses identified by DESI

COUNTRY	DESI 2020	STRENGTHS	WEAKNESSES
LATVIA	18	Performs well in **digital public services**, 5G and VHCN.	Performs weaker in digital skills and **digitalization of businesses**.
NORWAY	-	The 3rd most digital country according to DESI if compared with the EU28; high performance on Internet use and **digital public services**.	Performs weaker in **digital integration of businesses.**
ITALY	25	Very advanced on 5G. Performance in **digital public services** is improving.	Lags behind in the deployment of VHCN. Weak performance in digital skills and the **digitization of businesses**.
SPAIN	11	Very advanced in the provision of **digital public services** and performs particularly well in the deployment of VHCN.	Generally below EU average in digital skills indicators and has a relatively weak performance in the **digitization of businesses**, especially

[39] European Commission (2020), *Digital Economy and Society Index (DESI) 2020*. Retrieved from: https://ec.europa.eu/digital-single-market/en/news/digital-economy-and-society-index-desi-2020

			of SMEs.
AUSTRIA	13	Advanced on 5G, above EU average in the digital skills indicators and especially in **digital public services**.	Lags behind in the deployment of Very High Capacity Networks (VHCN) and has a relatively weak performance in the **digitization of businesses.**
PORTUGAL	19	Advanced in the deployment of VHCN and is above EU average in the provision of **digital public services.**	Lags behind in the assignment of radio spectrum for 5G, and has a weak performance in the digital skills indicators and **digital integration of businesses**.

Source: European Commission[40]

3.2.4 Digital Competitiveness Ranking

In 2017, the IMD World Competitiveness Centre published a separate report ranking countries' digital competitiveness for the first time. The new Digital Competitiveness Ranking introduces several new criteria to measure countries' ability to adopt and explore digital technologies leading to transformation in government practices, business models and society in general.

2020 is the fourth year, the IMD World Digital Competitiveness Ranking measures the capacity and readiness of 63 economies to adopt and explore digital technologies as a key driver for economic transformation in business, government and wider society. The methodology of the WDC ranking defines digital competitiveness into three main factors: - Knowledge - Technology - Future readiness. In turn, each of these factors is divided into 3 sub-factors which highlight every facet of the areas analysed. Altogether, the WDC features 9 such sub-factors (talent, training & education, scientific concentration, regulatory framework, capital, technological, adaptive attitudes, business agility, and IT integration). These 9 sub-factors comprise 52 criteria, which are used to calculate rankings.[41] The countries are ranked from the most to the least digitally competitive and the results from the previous year's scoreboard (2019) are shown in brackets. Please see the overall structure of Digital Competitiveness in Table 6.

Table 6. Overall structure of Digital Competitiveness

Knowledge		
Talent	*Training and education*	*Scientific concentration*
Educational assessment PISA – Math International experience Foreign highly skilled personnel Digital/Technological skills Net flow of international students	Employee training Total public expenditure on education Higher education achievement Pupil-teacher ratio [tertiary education] Graduates in Sciences Women with degrees	Total expenditure on R&D [%] Total R&D personnel per capita Female researchers R&D productivity by publication Scientific and technical employment High-tech patent grants
Technology		
Regulatory framework	*Capital*	*Technological*
Starting a business Enforcing contracts Immigration laws Technological regulation Scientific research legislation Intellectual property rights	IT & media stock market capitalization Funding for technology development Banking and financial services Investment risk Venture capital Investment in telecommunications	Communications technology Mobile broadband subscribers Wireless broadband Internet users Internet bandwidth speed High-tech exports [%]
Future readiness		
Adaptive attitudes	*Business agility*	*IT integration*
E-participation	Opportunities and threats	E-government

[40] European Commission (2020), Digital Economy and Society Index (DESI) 2020. Retrieved from: https://ec.europa.eu/digital-single-market/en/news/digital-economy-and-society-index-desi-2020

[41] IMD (2020), *IMD world digital competitiveness ranking 2020*, Retrieved from: https://www.imd.org/wcc/world-competitiveness-center-rankings/world-digital-competitiveness-rankings-2020/

Internet retailing Tablet possession Attitudes toward globalisation	Innovative firms Agility of companies Use of big data and analytics Knowledge transfer	Public-private partnerships Cybersecurity Software piracy

Source: IMD [42]

Best performers in terms of the digital competitiveness among the DigiBEST partner countries are Norway, which ranks 9th among 63 countries and has maintained the same ranking in 2020 as in 2019, and Austria, which ranks 17th in 2020 and has increased its competitiveness from 20th place in 2019. Norway is among the 10 top performers in terms of training and education (10), regulatory framework (3), capital (9), technological (9), adaptive attitudes (7), business agility (8) and IT integration (6), while Austria is among the best ten performers in terms of IT integration (9) (Please, see Table 7).

Table 7. IMD World Digital Competitiveness Ranking, 2020

Ranking/Country		Latvia	Norway	Italy	Spain	Austria	Portugal
WDCR 2020 (2019)[43]		**38** (36)	**9** (9)	**42** (41)	**33** (28)	**17** (20)	**37** (34)
Factor: knowledge		***36***	***16***	***42***	***32***	***11***	***33***
Sub-factors	*Talent*	27	16	42	32	12	24
	Training education	27	10	58	42	12	38
	Scientific concentration	49	23	22	20	14	30
Factor: technology		***34***	***3***	***46***	***33***	***28***	***38***
Sub-factors	*Regulatory framework*	37	2	48	36	24	20
	Capital	50	9	54	34	30	44
	Technological	13	9	43	27	33	42
Factor: Future readiness		***42***	***6***	***38***	***40***	***16***	***41***
Sub-factors	*Adaptive attitudes*	51	7	42	35	21	31
	Business agility	45	8	23	48	21	57
	IT integration	37	6	39	30	9	34

Source: IMD[44]

[42] IMD (2020), *IMD world digital competitiveness ranking 2020*, Retrieved from: https://www.imd.org/wcc/world-competitiveness-center-rankings/world-digital-competitiveness-rankings-2020/

[43] Data provided in brackets are for 2019.

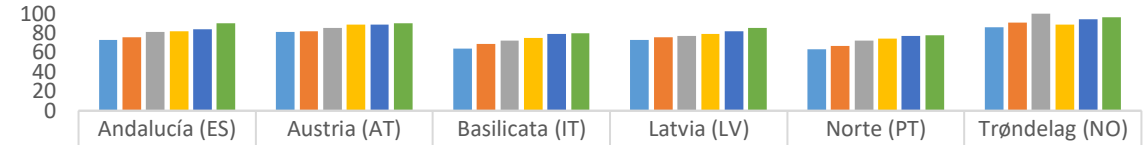
Overall results of the IMD World Digital Competitiveness Ranking show that countries which maintain efficient use of digital talent, effective regulation frameworks and a quick adoption of new technologies are showing the best performance in terms of digital competitiveness. These abilities will also be very important during the process of economic recovery after the COVID-19.

3.3 Comparison of the main regional level digitization indicators

This chapter provides an overview of the main digitalization indicators available on the NUTS 2 level, except Austria, on the Eurostat. In the case of Austria, the NUTS 1 level data has been used. Therefore, this analysis is mostly limited by the availability of data on the NUTS 2 level.

During the 6 years' period (2014-2019) the **household access to internet at home** has gradually increased for all DigiBEST partners' regions/countries reaching 100% in the case of Trøndelag, Norway in 2016 and then dropping back to 96% in 2019. The lowest indicators in terms of the internet access at home in 2019 were in the cases of Norte, Portugal (78%) and Basilicata, Italy (80%) (see Figure 10).

Figure 10. Households that have internet access at home, % of households with at least one member aged 16 to 74[45]



	Andalucía (ES)	Austria (AT)	Basilicata (IT)	Latvia (LV)	Norte (PT)	Trøndelag (NO)
2014	73	81	64	73	63	86
2015	76	82	69	76	67	91
2016	81	85	72	77	72	100
2017	82	89	75	79	74	89
2018	84	89	79	82	77	94
2019	90	90	80	85	78	96

Source: Eurostat[46]

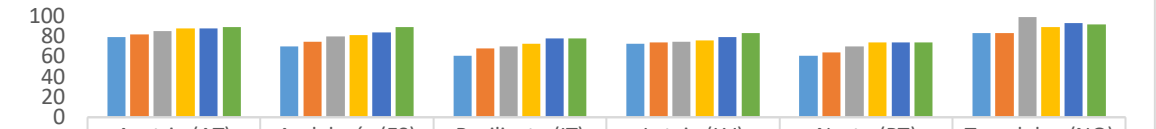
During the period of time from 2014 to 2019 the **household access to broadband** has gradually increased in cases of all DigiBEST partners' regions/countries reaching 100% in a case of Trøndelag, Norway in 2016 and then dropping back to 95% in 2019. The lowest indicators in terms of the internet access at home in 2019 were in the cases of Norte, Portugal (74%) and Basilicata, Italy (80%) (see Figure 10).

[44] IMD (2020), *IMD world digital competitiveness ranking 2020*, Retrieved from: https://www.imd.org/wcc/world-competitiveness-center-rankings/world-digital-competitiveness-rankings-2020/

[45] The access of households to the internet is measured as percentage of households where any member of the household has the possibility to access the internet from home.

[46] Eurostat (2020), *Households that have internet access at home by NUTS 2 regions*. Retrieved from: https://ec.europa.eu/eurostat/databrowser/bookmark/49a5dc8a-5f88-4783-9d93-632f11df8d8d?lang=en, viewed on 21.12.2020

Figure 11. Households that have broadband access, % of households with at least one member aged 16 to 74[47]



	Austria (AT)	Andalucía (ES)	Basilicata (IT)	Latvia (LV)	Norte (PT)	Trøndelag (NO)
2014	79	70	61	73	61	83
2015	82	75	68	74	64	83
2016	85	80	70	75	70	99
2017	88	81	73	76	74	89
2018	88	84	78	79	74	93
2019	89	89	78	83	74	92

Source: Eurostat[48]

With increasing access to the internet and broadband the number of **individuals regularly using the internet** is consequently gradually increasing during the analysed period (2014-2019). This indicator has increased in all DigiBEST partners' regions/countries reaching 99% in the case of Trøndelag, Norway in 2016 and then dropping back to 95% in 2019. The lowest indicators in terms of individuals regularly using the internet in 2019 were in the cases of Norte, Portugal (67%) and Basilicata, Italy (66%) (see Figure 12).

Figure 12. Individuals regularly using the internet, % of individuals[49]

	Andalucía (ES)	Austria (AT)	Basilicata (IT)	Latvia (LV)	Norte (PT)	Trøndelag (NO)
2014	67	77	48	72	55	88
2015	70	81	55	75	60	98
2016	74	82	61	77	63	99
2017	78	85	62	78	66	93
2018	80	85	68	81	66	95
2019	86	86	66	84	67	95

Source: Eurostat[50]

During the period of time from 2014 to 2019 a number of **individuals, who accessed the internet away from home or work,** has increased in all DigiBEST partners' regions/countries with some shifts in a case of Austria, where this indicator has decreased from 34% in 2015 to 25% in 2016, and from 36% in 2017 to 28% in 2018. Also, in a case of Trøndelag, Norway this indicator has decreased from 84% in 2016 to 77% in 2017. The greatest increase in a number of individuals, who accessed the internet away from home or work, was in the case of Latvia, where it has increased by 32% from 35% in 2014 to 67% in 2019 (see Figure 13).

[47] The availability of broadband is measured by the percentage of households that are connectable to an exchange that has been converted to support xDSL-technology, to a cable network upgraded for internet traffic, or to other broadband technologies.

[48] Eurostat (2020), *Households that have broadband access by NUTS 2 regions*. Retrieved from: https://ec.europa.eu/eurostat/databrowser/bookmark/e503e897-a0b1-4835-bcd4-1a9e25f2646b?lang=en, viewed on 12.12.2020

[49] Regular users of the internet are persons who use the internet on average at least once a week, every day or almost every day.

[50] Eurostat (2020), *Individuals regularly using the internet by NUTS 2 regions*. Retrieved from: https://ec.europa.eu/eurostat/databrowser/bookmark/79099f45-7ed4-479a-9c3b-dc8f0e76fe49?lang=en , viewed on 23.12.2020

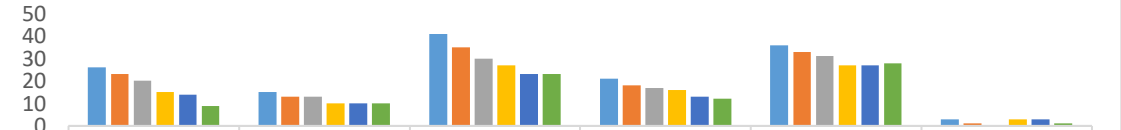
Figure 13. Individuals who accessed the internet away from home or work, % of individuals

	Andalucía (ES)	Austria (AT)	Basilicata (IT)	Latvia (LV)	Norte (PT)	Trøndelag (NO)
2014	60	57	19	35	34	74
2015	64	64	21	44	43	82
2016	70	65	28	48	45	84
2017	76	74	29	57	52	77
2018	79	74	38	59	56	93
2019	85	82	48	67	58	90

Source: Eurostat[51]

Despite a gradual decrease in a number of **individuals, who have never used a** computer during the period of time from 2014 to 2019, the greatest percentages in 2019 were in Norte, Portugal (28%) and Basilicata, Italy (23%). This indicator has greatly improved (by 18%) in a case of Basilicata, Italy, where a number of individuals who have never used a computer has decreased from 41% in 2014 to 23% in 2019 and in a case of Andalucía, Spain (by 17%), where a number of individuals who have never used a computer has decreased from 25% in 2014 to 9% in 2019. At the same time there was only 1% of individuals who have never used a computer in Trøndelag, Norway in 2015 (0 in 2016) (see Figure 14).

Figure 14. Individuals who have never used a computer, % of individuals 16-74 persons who have never used a computer (at home, at work or any other place)



	Andalucía (ES)	Austria (AT)	Basilicata (IT)	Latvia (LV)	Norte (PT)	Trøndelag (NO)
2014	26	15	41	21	36	3
2015	23	13	35	18	33	1
2016	20	13	30	17	31	0
2017	15	10	27	16	27	3
2018	14	10	23	13	27	3
2019	9	10	23	12	28	1

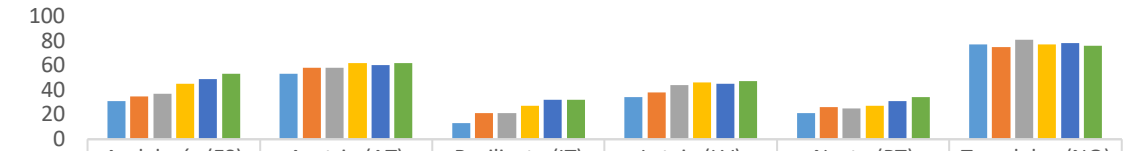
Source: Eurostat[52]

A number of **individuals, who ordered goods or services over the internet,** has increased in the DigiBEST partners' regions/countries in 2019 if compared with 2016, except Trøndelag, Norway, where it has decreased from 77% in 2014 to 76% in 2019. This indicator has greatly increased (by 22%) in the case of Andalucía, Spain, where a number of Individuals who ordered goods or services over the internet has increased from 31% in 2014 to 53% in 2019. At the same time, the lowest indicators in terms of individuals, who ordered goods or services over the internet, were in the cases of Norte, Portugal (34%) and Basilicata, Italy (32%) (see Figure 15).

[51] Eurostat (2020), *Individuals who accessed the internet away from home or work*. Retrieved from: https://ec.europa.eu/eurostat/databrowser/bookmark/190eaa63-0db2-40fb-8b57-18ff015a6df4?lang=en, viewed on 23.12.2020

[52] Eurostat (2020), *Individuals who have never used a computer by NUTS 2 regions*. Retrieved from: https://ec.europa.eu/eurostat/databrowser/bookmark/193d59ed-bba3-4774-bd40-effd207323ab?lang=en, viewed on 23.12.2020

Figure 15. Individuals who ordered goods or services over the internet for private use in the last year by NUTS 2 regions, % of individuals 16-74

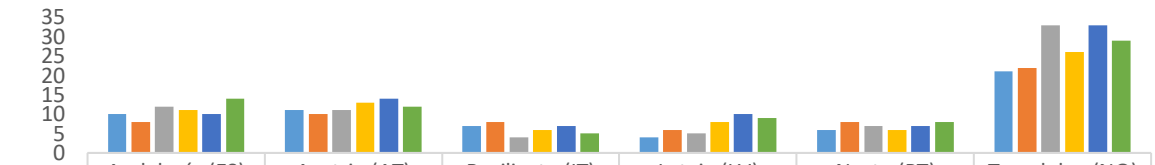


	Andalucía (ES)	Austria (AT)	Basilicata (IT)	Latvia (LV)	Norte (PT)	Trøndelag (NO)
2014	31	53	13	34	21	77
2015	35	58	21	38	26	75
2016	37	58	21	44	25	81
2017	45	62	27	46	27	77
2018	49	60	32	45	31	78
2019	53	62	32	47	34	76

Source: Eurostat[53]

A number of **individuals, who were selling goods or services over the internet,** has been shifting up and down in all DigiBEST partner countries during the analysed period (2014-2019). This indicator has shown a slight increase in 2019 if compared with 2014 in all DigiBEST partners' regions/countries, except Basilicata, Italy, where it decreased from 7% in 2014 to 5% in 2019. However, internet sales are still comparatively low in all DigiBEST partners' regions/countries, where Trøndelag, Norway is leading with 29% of internet sales (2019) down to Basilicata (Italy) with 5% of internet sales in 2019 (See Figure 16).

Figure 16. Individuals, who were selling goods or services over the internet, % of individuals



	Andalucía (ES)	Austria (AT)	Basilicata (IT)	Latvia (LV)	Norte (PT)	Trøndelag (NO)
2014	10	11	7	4	6	21
2015	8	10	8	6	8	22
2016	12	11	4	5	7	33
2017	11	13	6	8	6	26
2018	10	14	7	10	7	33
2019	14	12	5	9	8	29

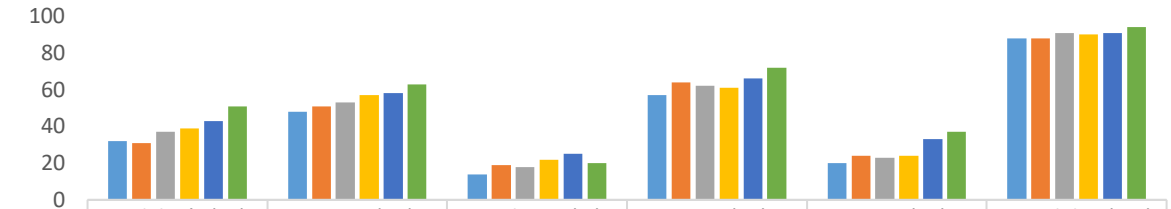
Source: Eurostat[54]

During the period of time from 2014 to 2019 a number of **individuals, who used the internet banking,** has increased in all DigiBEST partners' regions/countries reaching 94% of individuals in Trøndelag, Norway (2019). Still, the use of internet banking is still quite low in Basilicata, Italy – 20% in 2019 and Norte, Portugal – 37% (see Figure 17).

[53] Eurostat (2020), *Individuals who ordered goods or services over the internet for private use in the last year by NUTS 2 regions*. Retrieved from: https://ec.europa.eu/eurostat/databrowser/bookmark/ba4e5f6d-a214-48af-83fb-4c9b646c6588?lang=en, viewed on 23.12.2020

[54] Eurostat (2020), *Individuals who used the internet, frequency of use and activities*. Retrieved from: https://ec.europa.eu/eurostat/databrowser/bookmark/036950af-37d4-4c05-a1bb-c1553a236a08?lang=en, viewed on 23.12.2020

Figure 17. Individuals who used the internet banking, % of individuals

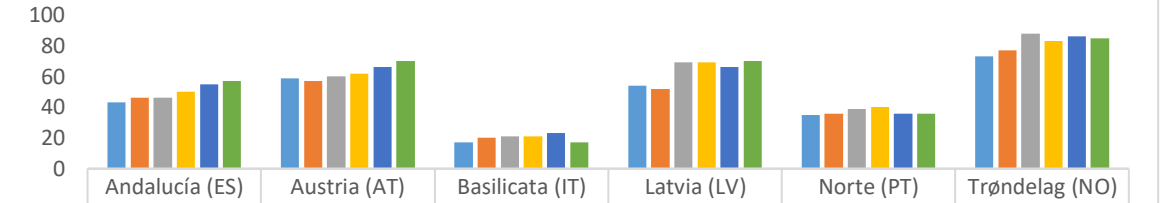


	Andalucía (ES)	Austria (AT)	Basilicata (IT)	Latvia (LV)	Norte (PT)	Trøndelag (NO)
2014	32	48	14	57	20	88
2015	31	51	19	64	24	88
2016	37	53	18	62	23	91
2017	39	57	22	61	24	90
2018	43	58	25	66	33	91
2019	51	63	20	72	37	94

Source: Eurostat[55]

During the analysed period (2014-2019) a number of **individuals, who used the internet for interaction with public authorities,** has also been increasing in Austria, Andalucía (Spain), Latvia and Trøndelag, Norway. At the same time this indicator has been quite low in the case of Basilicata (Italy) remaining at the same 17% level in 2019 as in 2014 with some increase during the period (2014-2019). And in the Norte, Portugal, the interaction with public authorities has increased by only 1% from 35% in 2014 to 36% in 2019 with some upward shifts in 2016 (39%) and 2017 (40%) (see Figure 18).

Figure 18. Individuals who used the internet for interaction with public authorities, % of individuals



	Andalucía (ES)	Austria (AT)	Basilicata (IT)	Latvia (LV)	Norte (PT)	Trøndelag (NO)
2014	43	59	17	54	35	73
2015	46	57	20	52	36	77
2016	46	60	21	69	39	88
2017	50	62	21	69	40	83
2018	55	66	23	66	36	86
2019	57	70	17	70	36	85

Source: Eurostat[56]

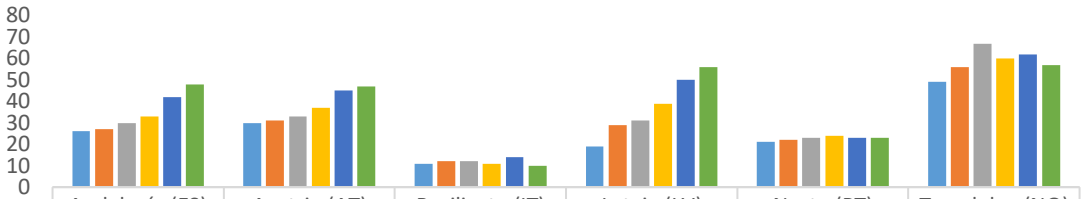
During the analysed period (2014-2019) a number of **individuals, who used the internet for interaction with public authorities for submitting completed forms,** has also been increasing in Austria, Andalucía (Spain) and Latvia Overall, this indicator has also increased in the case of Trøndelag (Norway) from 49% in 2014 to 57% in 2019 with some ups and downs during this period of time (2014-2019). At the same time this indicator has been quite low in the case of Basilicata (Italy) falling below the level of 2014 (11%) by one percent in 2019 (10%). There has been only a short-term increase for Basilicata in 2018 up to 14%. In the Norte, Portugal, the interaction with public

[55] Eurostat (2020), *Individuals who used the internet, frequency of use and activities*. Retrieved from: https://ec.europa.eu/eurostat/databrowser/bookmark/036950af-37d4-4c05-a1bb-c1553a236a08?lang=en, viewed on 23.12.2020

[56] Eurostat (2020), *Individuals who used the internet for interaction with public authorities*. Retrieved from: https://ec.europa.eu/eurostat/databrowser/bookmark/ac88a397-a99a-4585-84e6-f383014e3b11?lang=en, viewed on 23.12.2020

authorities has increased by only 2% from 21% in 2014 to 23% in 2019 with some increase to 24% in 2017 (see Figure 19).

Figure 19. Individuals who used the internet for interaction with public authorities: submitting completed forms, % of individuals

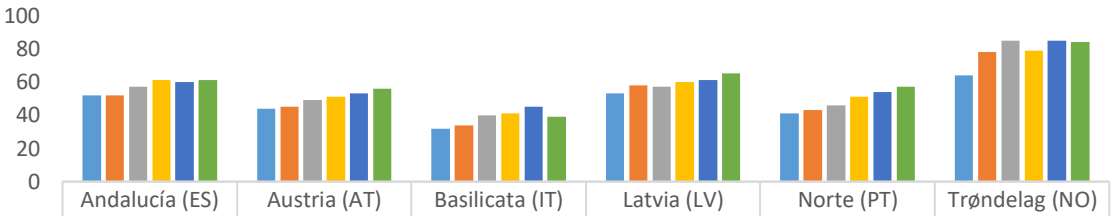


	Andalucía (ES)	Austria (AT)	Basilicata (IT)	Latvia (LV)	Norte (PT)	Trøndelag (NO)
2014	26	30	11	19	21	49
2015	27	31	12	29	22	56
2016	30	33	12	31	23	67
2017	33	37	11	39	24	60
2018	42	45	14	50	23	62
2019	48	47	10	56	23	57

Source: Eurostat[57]

On the overall, during the period of time from 2014 to 2019 a number of **individuals, who used the internet for participating in social networks,** has been slowly increasing in all DigiBEST partners' regions/countries reaching 84% of individuals in Trøndelag, Norway (2019). The use of social networks is still quite low in Basilicata, Italy, where only 39% of individuals were using social networks in 2019 (see Figure 20).

Figure 20. Individuals who used the internet for participating in social networks (creating user profile, posting messages or other contributions to Facebook, Twitter, etc.), % of individuals



	Andalucía (ES)	Austria (AT)	Basilicata (IT)	Latvia (LV)	Norte (PT)	Trøndelag (NO)
2014	52	44	32	53	41	64
2015	52	45	34	58	43	78
2016	57	49	40	57	46	85
2017	61	51	41	60	51	79
2018	60	53	45	61	54	85
2019	61	56	39	65	57	84

Source: Eurostat[58]

Results of the regional level digitization indicators shows that sales of goods or services over the internet have been quite low during the period of time from 2014 to 2019. Also, shares of internet sales haven't increased a lot during this period, which indicates that there are still a lot of problems and drawbacks for promoting internet sales in the DigiBEST partners' regions/countries.

[57] Eurostat (2020), *Individuals who used the internet for interaction with public authorities*. Retrieved from: https://ec.europa.eu/eurostat/databrowser/bookmark/ac88a397-a99a-4585-84e6-f383014e3b11?lang=en, viewed on 23.12.2020

[58] Eurostat (2020), *Individuals who used the internet, frequency of use and activities*. Retrieved from: https://ec.europa.eu/eurostat/databrowser/bookmark/036950af-37d4-4c05-a1bb-c1553a236a08?lang=en, viewed on 23.12.2020

Unfortunately, the limitation of data doesn't allow us to make further conclusions about reasons that keep away enterprises from selling their products and services digitally. Therefore, this issue has been further analysed by the Digital Transformation Assessment Surveys performed in the DigiBEST partners' regions/countries during 2020. The results of these surveys will be discussed in Chapter 7.

4. DigiBEST partners' profiles and good practices

4.1. DigiBEST partners' profiles

4.1.1 Republic of Latvia[59]

Population:	1.907 million (2020, CSB)
Territory:	64 589 km^2
Population density:	31 inhabitants/km^2 (2020, CSB)
GDP per capita:	15 928 EUR (2019)
Real GDP growth:	2.2**%** (2019)
GDP PPS per capita:	22 252 (2019)
Unemployment rate:	6.3% (EU28: 6.2%) (2019)
ICT sector from GDP:	4.9% (2018)
Total R&D expenditure:	0.6% (GERD, % of GDP) (2018)
SMEs and microenterprises:	80 358 (2017)
Workforce working in the ICT sector:	3.1 % (2019)
Workforce working in SMEs and microenterprises:	463 115 (70%) work for SMEs and 202 748 (30%) work for microenterprises (2017)

Source: Eurostat, if not indicated differently (Central Statistical Bureau (CSB), Table ISG010. PPS – Purchasing Power Standard

Location and structure

Latvia (officially – *Republic of Latvia*) is one of the three Baltic States, located on the east coast of the Baltic Sea at the crossroads of Northern and Eastern Europe. It borders Estonia, Russia, Belarus, and Lithuania. Latvia also has a maritime boundary with Sweden. The capital and largest city is Riga.

Latvia is a parliamentary republic governed by the unicameral Parliament (*Saeima*) and Cabinet of Ministers (*Ministru kabinets*) with Prime Minister on top, whereas cities and municipalities are headed by local Councils. Since the last administrative territorial reform (June 2020), Latvia has been divided into 6 statistical regions (NUTS 3) and 42 municipalities instead of the previous 119 local governments (110 municipalities and 9 cities).

Urban/rural population

Most of the population in Latvia is concentrated in urban (68%, 1'306 million), rather than rural areas (601 thousand), where 1/3 population lives in the capital city, showing one of the highest shares in Europe (627 thousand).[60]

Transport infrastructure

Latvia's transport system includes a road network, connecting with EU and non-EU countries (Belorussia and Russia); railway connection with Far East and Russia; maritime (three ice-free ports) as well as aviation - Riga has the largest international airport in the Baltic States. Thus, the transport

[59] Information about Latvia is provided on the national level, considering NUTS 2 level classification. This chapter is elaborated based on the DigiBEST Regional Study of Latvia (MoEPRD) and its own author's information search (University of Latvia). Data on demographic and economic performances are taken from Eurostat, if not indicated differently.

[60] Based on the data of Central Statistical Burau at the beginning of 2020, Table ISG030, ISG050

sector and country's favourable geographical location ensure access to Western European, Russian and other markets.[61]

Economic development and main sectors

Industrialization in Latvia began in the latter part of the 19th century, and by the late 20th century the country was the most heavily industrialized of the Baltic States. Substantial economic changes occurred following Latvia's independence in 1991, as the country transitioned to a market economy. The production of furniture, foodstuffs, beverages, and textiles had replaced machine building and metal engineering as Latvia's leading manufacturing activities by the late 1990s.[62]

Latvia has a small economy and its exports contribute more than half of GDP. Due to its geographical location, transit services are highly developed, along with timber and wood-processing, agriculture and food products, as well as manufacturing of machinery and electronics industries.[63]

Until 2019, Latvia's economic growth remained stable by exceeding the EU average. From 2011 to 2019, GDP grew by an average of 3.3% annually. In 2019, GDP growth has dropped till 2.3%. Considering the covid-19 pandemics, the forecasted GDP for 2020 is -5.5%.[64]

Figure 21. Map of Latvia

Source: Encyclopædia Britannica

Digital infrastructure

Latvia is well known for providing high-speed internet, with almost complete 4G coverage. In 2019, Latvia also became one of the first countries worldwide which started to introduce the 5G network

[61] Investment and Development Agency of Latvia (LIAA) (2020), *Transport and Storage in Latvia*. Retrieved from: https://www.liaa.gov.lv/en/invest-latvia/key-sectors/transport-and-storage; LIAA (2020), *Business Infrastructure in Latvia*. Retrieved from: https://www.liaa.gov.lv/en/invest-latvia/business-guide/business-infrastructure-latvia

[62] Smogorzewski, K.M., et al (2021 last upd), *Latvia, Economy*, "Britannica Encyclopaedia". Retrieved from: https://www.britannica.com/place/Latvia/Economy#ref37308

[63] Ministry of Economics of Republic of Latvia (2020), *Overlook of the Latvian Economic situation 2020*. Retrieved from: https://www.em.gov.lv/en/economic-situation-0

[64] Ministry of Economics of Republic of Latvia (2019), *Overlook of the Latvian Economic situation 2019*. Retrieved from: https://www.zemeunvalsts.lv/documents/view/35051070e572e47d2c26c241ab88307f/Latvijas%20ekonomisk%C4%81s%20att%C4%ABst%C4%ABbas%20p%C4%81rskats%202019.pdf

coverage.[65] Accordingly, such advanced broadband facilitates the development of digitised services and implementation of National digital strategy, as well as business sector development.

According to the DESI index (2020), in general Latvia ranks 18th (scoring 50.7) within the EU - facing three places down compared to the previous two years and thus scoring below the EU average (52.6). However, it still remains one of the top performers in such dimension as digital public services and connectivity, while human capital, use of internet services, integration of digital technologies in business significant improvements. [66]

For Latvia, innovation performance is assessed at the country level. Based on the European Innovation Scoreboard 2020, it is classified as a Moderated Performer and ranking below the EU level.[67]

Policy and support instruments

In the new budgeting period, ICT continues to be one of the Latvian priorities. The Ministry of Regional Development and Environmental Protection (MoEPRD) is the state authority responsible for the implementation of Digital Agenda in Latvia that is addressed in the new policy document **Digital Transformation Guidelines for 2021-2027**[68] – aiming at the continuation of public administration and services development, where Latvia currently ranks 4th in the EU (as of DESI); enhancing the business digitalisation, and the provision of digital skills to equip society not only with basic skills but also knowledge for the development of new products. Guidelines provide five action directions: digital skills and education; digital security and credibility, access to telecommunications services, digital transformation of the economy (so-called "public administration"); innovation, ICT industry and ICT science. [69]

ICT development is also set as one of the five specialisation areas of **Latvia's Smart Specialization Strategy (RIS3)** with a cross-sectoral significance, which is also reflected in the national level strategic planning documents.

National Industrial Policy Guidelines 2021-2027 (in Latvian only) – a medium-term policy planning document for promotion of all economic sectors at the local and international levels – that cover 5 action directions: human capital; innovation (including digital transformation); business environment for export capacity; infrastructure (including automation and digitalisation of businesses), access to finance.

Further activities are important in the process of fostering business digital transformation:[70] **Competence Centre Programme** (by Ministry of Economics) – has enabled 8 competence centres to be set up, corresponding to areas of Latvia's RIS3; 3 **Digital Innovation Hubs** acting as centres of digital excellence and one-stop-shops for digital transformation; **Innovation motivation programmes** (e.g., hackathons) and **Technology Transfer programme** to promote innovation activities in SMEs (innovation vouchers, research and innovation support, start-up support); training programmes to

[65] LR Ministru kabineta tiesību aktu projekti (2019). In*formatīvais ziņojums "Ceļvedis piektās paaudzes (5G) publisko mobilo elektronisko sakaru tīklu ieviešanai Latvijā".* Retrieved from: http://tap.mk.gov.lv/lv/mk/tap/?pid=40471250

[66] European Commission (2020), Desi Index, Latvia 2020. Retrieved from: https://ec.europa.eu/digital-single-market/en/scoreboard/latvia

[67] European Commission (2020), *European Innovation Scoreboard 2020*. Retrieved from: https://ec.europa.eu/commission/presscorner/detail/en/QANDA_20_1150

[68] DTG 2021-20271is a part of the medium-term policy instrument – National Development Plan for 2021-2027 (the aspects related to digital entrepreneurship include the increase in R&D efforts in the defined priority scientific areas, reduction of obstacles for entrepreneurs, ensuring a high-speed connectivity throughout Latvia, as well as the development of digital content, product and e-services to expand the use of digital technologies in the economy and in the population), which is elaborated under the main national long-term development planning document Latvia's Sustainable Development Strategy to 2030 (Latvia2030))

[69] The Ministry of Environmental Protection and Regional Development (2020), Latvian Digital Transformation Guidelines for 2021-2027. Retrieved from: https://www.varam.gov.lv/en/article/latvian-digital-transformation-guidelines-2021-2027-accellation-digital-capacities-future-society-and-economy

[70] Mostly have been implemented with the support of the Operational Programme „Growth and Employment 2014 - 2020"

boost digital skills and networking activities (LIKTA, IT Cluster) and others (see also Good Practices of Latvia in Section 4.2.).

In the light of Covid-19 pandemics, 20% of the EU financial support instrument - Recovery and Resilience Facility are allocated to digital transformation to be used for SMEs and its innovation, digital skills, infrastructure (5G) and public administration.[71]

According to research results of the Regional Study, the **most important challenges of Latvia:**

the low adoption of technology and one of the lowest e-commerce performances in the EU. Mainly due to the low awareness about digital solutions, lack of enterprise capacity to lead business' digital transformation (shortage of experts, small business owners usually have no advanced/ sufficient skills, lack of funding or unwillingness/fear to invest in digitalization as well as SMEs haven't identified their business needs & don't know what to order from IT specialists). There are also difficulties to identify those micro and small businesses with a low level of digitalization (lack of information, research studies) to cope with this problem.

There is no common platform which consolidates all information available for entrepreneurs in one place (decentralized activities & communication).

Source: elaborated based on the DigiBEST Regional Study of Latvia

Key stakeholders

Table 8. List of the DigiBEST key stakeholders in Latvia

Organizations	Role/function
Ministry of Environment Protection and Regional Development (MEPRD)	Policy maker (responsible for environment protection, regional development & ICT areas, including overall digital transformation strategy)
Ministry of the Economics of the Republic of Latvia	Policy maker (responsible for entrepreneurship development policy, industrial and service policy & other areas)
The Latvian Association of Local and Regional Governments (municipalities)	Public organisation associating local governments of Latvia on voluntary basis (represents and defends interests of local governments, contributes into the development of municipal policies)
Kurzeme Planning Region's* Entrepreneurship Centre	Public entity, coordination of functions between the MEPRD and local municipalities (business support & training activities)
Riga Planning Region Entrepreneurship Support Centre	Fosters and implements business support activities
Vidzeme Planning Region Entrepreneurship Centre	Provides coordinated support for business development in the region
Zemgale Planning Region Entrepreneurship Centre	Facilitates a regional cross-sectoral business support network to act as a knowledge & resources exchange, providing coordinated support for business development in the region
Zemgale Region Human Resource and Competences Development Centre, Entrepreneurship	Municipal educational institution for Jelgava city and Zemgale region (educational and business support activities on digitalisation)
Jelgava Municipality	Responsible for local sustainable development policy and

[71] ES Fondi, *Eiropas Atveseļošanas un noturības mehānisms*. Retrieved from: https://www.esfondi.lv/atveselosanas-un-noturibas-mehanisms

	development of integrated business support
Jelgava city Municipality/ Administration Office	Perform statutory functions, provide services that are necessary for the public interest and needs
Ventspils Municipality 'Ventspils Digital Centre'	Facilitates the use of digital technologies among citizens and businesses of Ventspils municipality
Latvian Information and communications technology association	Promotes the development of information society and ICT education, unites ICT professionals and companies/organisations
Latvian IT Cluster	Fostering SMEs digital transformation (assessing maturity, providing mentoring), training activities, knowledge transfer, networking
The Latvian Chamber of Commerce and Industry	Representing SMEs and business organisations
Latvian Employers' Confederation	The largest association representing employers
Latvian Open Technology Association	ICT industry association promoting cooperation between technology suppliers and public sector consumers

Source: MoEPRD mission letter on DigiBEST Stakeholder's Support Group. *Planning regions – are local government cooperation bodies, under the MEPRD, with the function to represent interests of the regions at the national level, to plan and coordinate the regional development

To get in touch with Latvian stakeholder indicated in the table 8, please contact representatives of the Ministry of Environment Protection and Regional Development:

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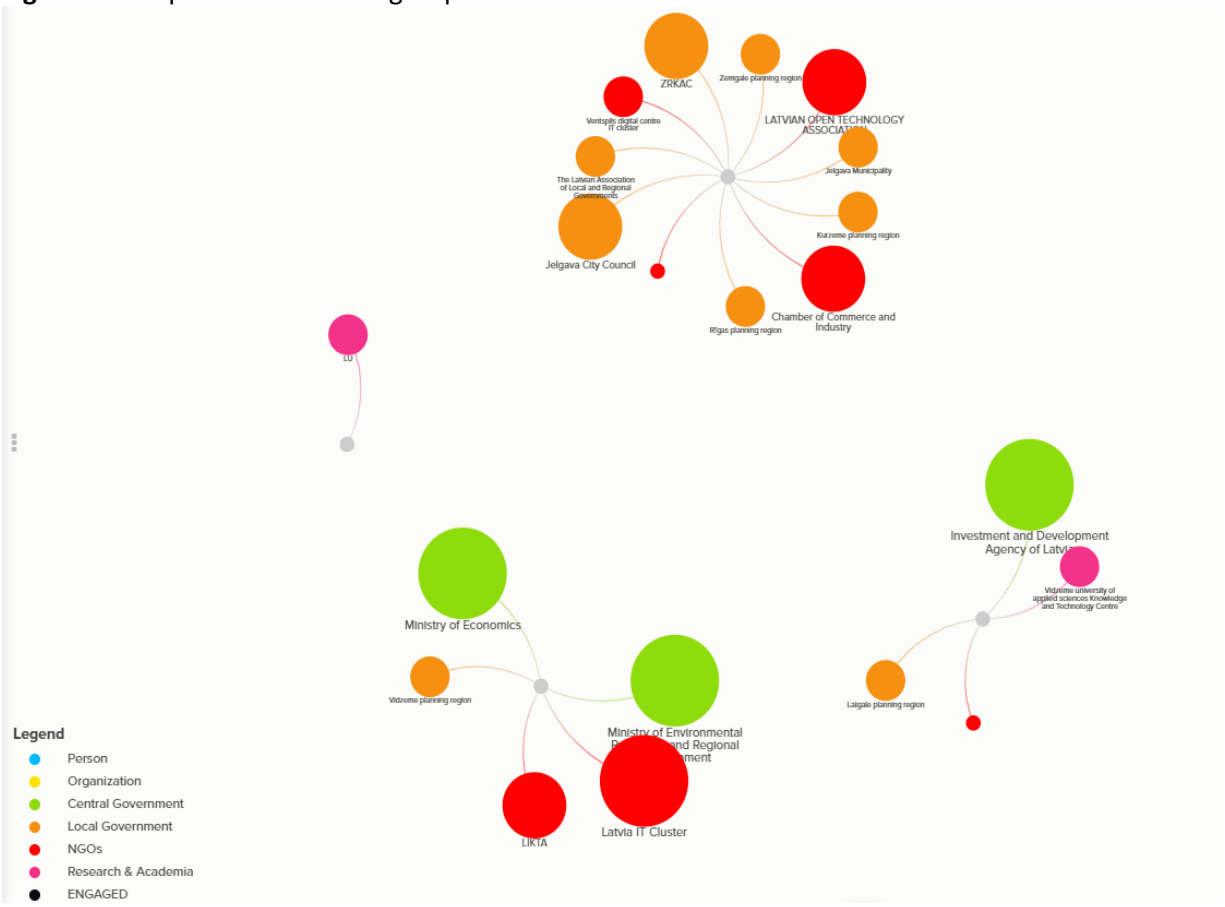
Jūlija Kovaļska, Project Coordinator	julija.kovalska@varam.gov.lv

Figure 22. Map of Stakeholders' groups in Latvia



Source: KUMU Map

4.1.2 Trøndelag County (Norway)[72]

Population:	465 634 (8.7% of Norway) (Statistics Norway, 2019)
Territory:	59 668.18 km^2 (15.5 % of Norway) (NMA)
Population density:	7.80 inhabitants/km^2 (2019, NMA, Statistics Norway)
GDP per capita:	45 500 EUR (in Norway: 64 400 EUR) (2019)
Real GDP growth:	1.5% (Statistics Norway, 2018)
GDP PPS per capita	35 200 (2017)
Unemployment rate:	2.2% (2019, Statistics Norway) (EU28: 6.2%)
ICT sector from GDP:	n/a (Norway: 3.43%, 2017)
Total R&D expenditure:	4.79 % (GERD, % of GDP) (2018)
SMEs and microenterprises:	10 853 (2017)
Workforce working in the ICT sector:	n/a (Norway: 4.6%, 2019)
Workforce working in SMEs and microenterprises:	n/a

Source: Eurostat, if not indicated differently (Norwegian Mapping Authority (NMA), Statistics Norway tabbell: 07459, tabell: 07195, tabell: 11713 and 09391). PPS - Purchasing Power Standard

Location and structure

In the 20th century Trøndelag existed as two separate counties (*fylker*), North and South Trøndelag. In 2018, the two counties were reunited into Trøndelag County. Currently, it's the 2nd largest county in Norway (out of 11) and due to its location is referred as Mid-Norway. The area of the county is equal to that of Switzerland – it takes seven hours by car to reach the southern part from the north (500 km). Trøndelag consists of 38 municipalities and over the period 2010-2019 has experienced a population growth by 11.1%.

Trøndelag County Council (*Trøndelag fylkeskommune*) is a regional public body. It is responsible for secondary schools, county roads, public transport (bus, ferries, high speed coastal express boats), and other services like orchestrating and facilitating regional digital development through local stakeholders, such as business gardens, incubators, business networks/clusters and others.

Urban/rural population

According to Statistics Norway, number of urban residents in Trøndelag makes 347 331, which is about 74.56% of the total population in the region (2019).[73]

Transport infrastructure

Transport infrastructure of the county is very well developed. It consists of roads, railroad, airports, ferries and coastal high-speed passenger boats. Trondheim Airport Værnes is an international airport located close to Trondheim.

Economic development and main sectors

Trøndelag has a positive growth in numbers of population development, employment, value creation and export and it has a highly educated population.[74] It experiences a steady growth within all the

[72] This chapter is elaborated based on the DigiBEST Regional Study of the Trøndelag County (by the Trøndelag County Council) and author's own information search (University of Latvia). Data on demographic and economic performances are taken from Eurostat, if not indicated differently.

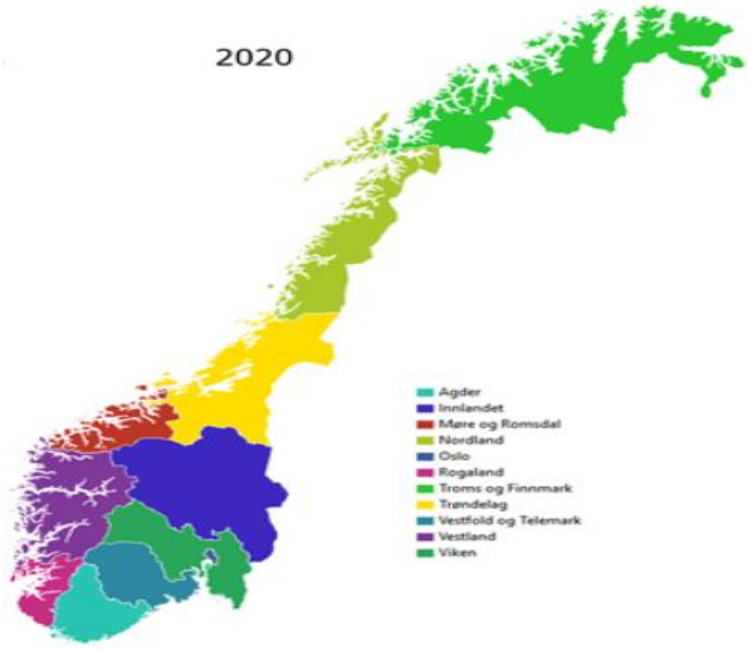
[73] Statistics Norway, *Area and population of urban settlements* (C), Table 04860. Retrieved from: https://www.ssb.no/en/statbank/table/04860/tableViewLayout1/

main areas of economic activity. 92% of the regional businesses have less than 10 employees and represent 23% of the employment (excluding public and primary sector) – these businesses are considered vulnerable in terms of digital transformation.

The county is primarily a rural region with rich and diverse natural resources. Forestry, aquaculture and agriculture are the dominant sectors in terms of employment and export incomes (specifically seafood). Aquaculture has a strong competence environment in both companies and academia, which provides good conditions for creating profitable jobs based on salmon fish farming. Among other important sectors are the oil and gas industry with the strong research and business environments e.g., Kvaerner Verdal - a large offshore oil/gas shipyard, the process industry with strong environments, and the tourism industry which were growing rapidly before the covid-19 pandemic.

Trondheim city, with its vibrant international community, is the technological capital of Norway – with one of Europe's largest independent research institutes SINTEF (*Stiftelsen for Industriell og Teknisk Forskning*), and the Norwegian University of Science and Technology (NTNU); among the world-leading competence environments within technology and science. [75]

Figure 23. Map over Norway with Trøndelag



Source: map supplied by Trøndelag County Council, Trøndelag in yellow colour

Digital infrastructure

The network connection (fixed and mobile) is widely available, and its coverage improves from year to year in the Trøndelag county - 86% of the area is covered by fixed broadband of 30 Mbps and 82% by 100 Mbps. Also, mobile network (4G) covers most of the Trøndelag area (86%)[76].

In the national context, Trøndelag is the most advanced region in relation to developing digital networks in rural areas – "efforts of the county" are promoted within the other counties and municipalities. Although it has a broad coverage of mobile network and broadband access, small

[74] Trøndelag County Council (2019), *Trøndelag in Numbers.* Retrieved from: https://www.trondelagfylke.no/contentassets/ee663ed54e2c4545a5eb95df0f6f7e0f/trondelag-i-tall-2019.pdf

[75] NHO (2020), *The business community in Trøndelag*. Retrieved from: https://www.nho.no/regionkontor/nho-trondelag/naringslivet-i-trondelag/

[76] Nkom (2019), *86 percent have access to high-speed broadband.* Retrieved from: https://www.nkom.no/aktuelt/86-prosent-har-tilgang-til-bredband-med-hoy-hastighet

companies in the most rural areas still experience less than satisfactory internet access. The County council in collaboration with local municipalities from 2020 has taken responsibility through the public subsidies to extend network coverage in the areas where its currently lacking.

DESI index is provided only at the national level, where Norway is acting above the EU average (52.6 in 2020) and is ranking the 3rd place among EU Members. Index has grown from 61.9 in 2018 to 69.5 in 2020. Also, performance by all five index's dimensions is above the EU. [77]

As of Regional Innovation Scoreboard, in 2019 Trøndelag, together with the capital region *Oslo og Akershus*, was an Innovation Leader, whereas Norway performed within the lower group – Strong Innovator, and within the top-25 of most innovative European regions (136.8, 15th rank).[78]

Policy and support instruments

There is no separate strategy that is focusing on the digital transformation of SMEs in Trøndelag, nor in Norway, however there is several regional strategies and plans that interact and create the environment for-, and possibilities to support digital transformation: Trøndelag County Council (2019) **Plan for Economy 2020-2023** to enhance competences and develop business sector; the strategy **"Value Creation in Trøndelag"** (strategy for innovation and wealth creation) (2017)[79], where one of five priorities is focusing on the "Smart Societies", and the **Action Programme 2020-2021 of the "Value Creation in Trøndelag"**[80] with the specific measures to promote digital and technological skills in the business and public sectors and to promote digitized working processes as well as developing new collaboration (ecosystems) and digital business models.

There is also a support tool «**Industry 4.0 Trøndelag - increasing digital skills in small- and micro businesses**» (2019-2023) – multiple step program aiming to develop the digital skills in 400 micro/ small companies of Trøndelag and inspire entrepreneurs digitally transform their businesses (idea of the tool was born under the DigiBEST project).

Approximately 5 million EUR (out of ~10 mill EUR) from Regional Development Funds are yearly allocated to support business development and innovation mainly through the strategies described above. Only businesses in rural parts of the region are eligible for receiving funds.

The main challenges of the region in the process of SMEs digitalisation are related to low awareness about digitalisation benefits; limited cooperation between SME's and the R&D environment, education and R&D institutions are mainly present in the Trondheim; urban-rural digital divide (most of the Trøndelag has rural areas); and to lack of coordinated approach for digital transformation in the region.

The most vulnerable in terms of digital transformation are small companies & companies of specific industries and those from rural areas – that are lacking sufficient digital knowledge and skills (not technology savvy), lacking resources to invest in digital technologies and afford ICT experts to design and lead digital strategy, as well as find it difficult to plan future and has no cooperation with R&D environment and other businesses.

Source: elaborated based on the DigiBEST Trøndelag Regional Study

[77] For DESI 2020, the improved methodology was used, taking into account the latest technological developments, also indexes of 2018 and 2019 were recalculated based on the improved approach. Retrieved from: https://ec.europa.eu/digital-single-market/en/scoreboard/norway

[78] European Commission (2019), *Regional Innovation Scoreboard*. Retrieved from: https://ec.europa.eu/growth/sites/growth/files/ris2019.pdf

[79] The strategy was designed to tackle small businesses that are distributed through the County.

[80] Trøndelag fylkeskommune (2019), *Action program 2020-2021- for the strategy "Value Creatin Trøndelag"*. Retrieved from: https://www.trondelagfylke.no/contentassets/b91afe6250b342e9b2d73dc270993796/handlingsprogram-politisk-vedtatt-en-final-13.02.20.pdf

Key stakeholders

The main stakeholders are considered Business gardens and Incubators that can tackle SMEs directly and enhance their digital competence, the rest of the players are important to enable ecosystem for digital transformation through close cooperation and active involvement in the projects (see Table 9 below).

Table 9. List of the DigiBEST key stakeholders in Trøndelag County

Organizations	Role/function
Trøndelag County Council	Regional authority (policy maker)
Orkdalsregionen Businessgarden AS	Business garden - assisting local SME's in building digital skills
Røros region Businessgarden AS	Business garden - assisting local SME's in building digital skills
Tindved Cultural garden AS	Business garden - assisting local SME's in building digital skills
The Nationalpark Businessgarden AS	Business garden - assisting local SME's in building digital skills
Fosen Innovasjon (INVOLVED INDIRECTLY)	Incubator – assisting local SME's building digital skills
Proneo AS	Incubator – assisting local SME's building digital skills
INAM AS	Business garden - assisting local SME's in building digital skills
T:Lab AS	Incubator – assisting local SME's building digital skills
Nord University	University – contributing with tech competence business models as partner
NTNU University	University – contributing with digital competence as partner
Skogmo Industrial park	Industrial park - competence as partner

In order to reach the listed stakeholders, please contact the representatives of the Trøndelag County Council:

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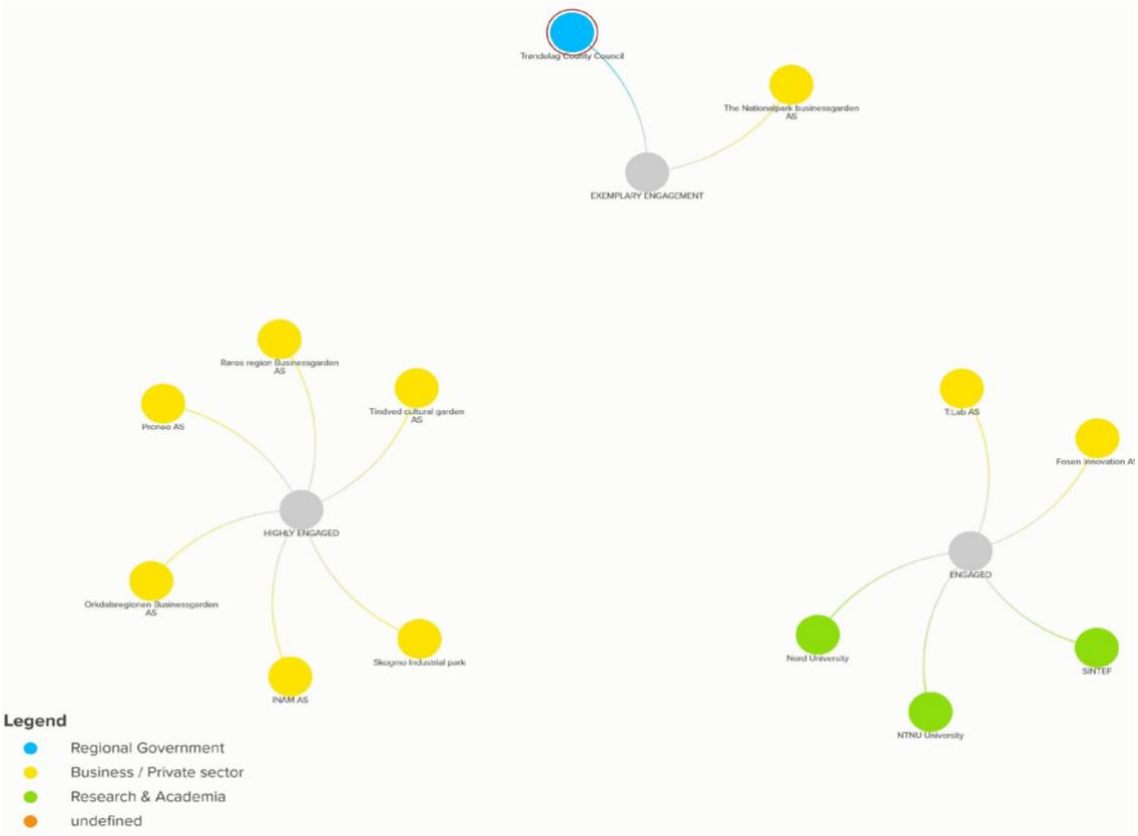
Contact person: Eistein Guldseth
Tel +47 741 740 00, Tel +47 414 748 26
E-mail: eisgu@trondelagfylke.no

Figure 24. Map of Stakeholders' groups in Trøndelag



Source: KUMU Map

4.1.3 Basilicata Region (Italy)[81]

Population:	556 934 (0.93% of national total) (Basilicata Statistica, 2019)
Territory:	10 073 km^2 (Basilicata Statistica)
Population density:	55 inhabitants/km^2 (2019)
GDP per capita:	20 800 EUR (in Italy: 29 200 EUR) (2019)
Real GDP growth:	0.6% (2019)
GDP PPS per capita	22 600 EUR (2018)
Unemployment rate:	10.8% (EU28: 6.3%) (2019)
ICT sector from GDP:	3.29% (Italy, 2018)
Total R&D expenditure:	0.63% (GERD, % of GDP) (2018)
SMEs and microenterprises:	13 570 (2017)
Workforce working in the ICT sector:	3.5% (Italy, 2019)
Workforce working in SMEs and microenterprises:	43 385 (53%) work for SMEs and 38 857 (47%) work for microenterprises (2017)

Source: Eurostat, if not indicated differently (Basilicata Statistics). PPS – Purchasing Power Standard

Location and structure

Basilicata Region, named also *Lucania*, is the 14th largest in the south of Italy (out of 20) with the ordinary autonomy, located in the centre of the Mediterranean and bounded by the regions of Puglia (in the north, east), Campania (west) and Calabria (south) as well as two seas (Ionian and Tyrrhenian). The regional capital is Potenza. Basilicata is divided into two provinces (Potenza and Matera) as well as into 131 municipalities. In terms of the territory size, it's the third smallest region covering about 3% of Italy.

Urban/rural population

Hilly mountain areas make up over 90% of its territory, rendering it one of the most sparsely populated in Italy (about 55 inhabitants per km² compared to the national average of 202).[82] [83] Thus the region is largely rural with population dispersed over small towns and villages (80% of the population lives in municipalities under 5 000 and the biggest town has fewer than 70 000 inhabitants). [84]

Transport infrastructure

Due to the mountainous terrain and peripherally area, it's difficult to ensure sufficient transport communications to other regions or abroad, which makes it the least accessible regions of Italy. The main means of available transport – road connection (few motorways), rail connection with limited extension and a small airport (for small aircrafts and private use).

Economic development and main sectors

Historically weak, Basilicata's economy picked up significantly during the 1990s, following the arrival of international companies (Barilla and Fiat in the Melfi city – automotive sector), the discovery and exploitation of oil and gas, and the emergence of a trend towards more dynamic entrepreneurship led to a noticeable change in performance. Apart from the industrial areas around Potenza and

[81] This chapter is elaborated based on the DigiBEST Regional Study of Basilicata Region and own author's information search (University of Latvia). Data on the demographic and economic performances are taken from Eurostat, if not indicated differently.

[82] OECD 28th Territorial Development Policy Committee (2012), *Public Investment across Levels of Government: The Case of Basilicata, Italy.* Retrieved from: http://www.oecd.org/cfe/regionaldevelopment/basilicata_edited.pdf

[83] Eurostat (2020), *Population density.* Retrieved from: https://ec.europa.eu/eurostat/databrowser/view/tps00003/default/table?lang=en

[84] CRE:HUB (2018), *CRE:HUB Joint Report on Cultural and Creative Industries*. Retrieved from: https://www.interregeurope.eu/crehub/news/news-article/3756/cre-hub-state-of-art-joint-report/

Matera, the Basilicata economy is also characterised by agriculture, construction, real estate, and tourism services (UNESCO World Heritage Sassi di Matera, Matera 2019 – European Capital of Culture [85]; Magna Grecia; coastal tourism). [86] [87] [88]

In the region, there are also present the important production centres (automotive, agro-food, craftsmanship and design), research centres of international importance and the University of Basilicata that gives an opportunity to foster collaboration between business and research worlds (particular through the regional clusters, agri-food, green chemistry, aerospace industries).

According to Eurostat, GDP per capita has steadily grown in the region from 2014 to 2018, whereas in 2019 it has dropped (from 21 400 to 20 800 EUR, which is below national GDP – 29 700 EUR).

Figure 25. Map over Basilicata (green)

Source: https://www.chimica-online.it/come-quando-perche/confini-basilicata.htm

Digital infrastructure

The digital infrastructure of Basilicata is currently under the restructuring process – it foreseen that work will be completed by the end of 2021, where 80% of households should receive broadband coverage with the speed of 100 Mbps and for the rest population – 30 Mbps speed lines should be

[85] *Matera 2019, Capitale Europea della cultura*. Retrieved from: https://www.matera-basilicata2019.it/en/

[86] OECD 28th Territorial Development Policy Committee (2012), *Public Investment across Levels of Government: The Case of Basilicata, Italy.* Retrieved from: http://www.oecd.org/cfe/regionaldevelopment/basilicata_edited.pdf

[87] Automotive sector and tourism (which significantly rose in the recent years and contributed to economy) has been hit hard by the covid-19 pandemic crisis.

[88] LSE (2011), *evaluation of the main achievements of cohesion policy programs and projects over the longer term in 15 selected regions*. Retrieved from: https://ec.europa.eu/regional_policy/sources/docgener/evaluation/pdf/eval2007/cohesion_achievements/basilicata.pdf

provided. Currently only 31.7% of the population can surf the web of 100 Mbps, whilst the remaining ~67.8% can be guaranteed with the 30 Mbps speed.[89]

Although during the last years (2011-2019) Basilicata region has experienced improvements of the Regional Innovation index by 15%, it is still considered as insufficient – Basilicata is acting as Moderate Innovator.[90] The local innovative system (R&D) is considered as low – due to the difficulty to produce innovations, including generation of patents, within the internal private sector, SMEs and public sector in order to advance technologically have to purchase equipment and technologies outside the region. This also leads to the reduction of R&D cooperation between the private sector and public research system.[91]

According to the DESI edition 2020, Italy has one of the lowest ranks – 25th out of EU28 and scoring 43.6 (EU28 average: 52.6), before the pandemic situation, in 2019, it was at the position 23 with the score 42.6 (EU28 average: 49.4).[92]

The most important challenges of the Basilicata Region:

Lack of infrastructure to deliver services, insufficient high speed broadband coverage, due to the mountainous terrain and widespread rural areas; lack of digital skills and knowledge on digital opportunities and regional experts for leading digital transformation/strategy, specifically in small businesses (where one of the reasons is small share of graduates in technical industries, education doesn't meet the demanded skills of the labour market); lack of the awareness; concentration of digital competence in urban areas (urban-rural digital divide). There is no coordinated approach towards digital transformation in the region. Also, a low SMEs capitalisation and insufficient innovation potential of SMEs (low investments, lack of coordination between structures responsible for innovation and digital development, youth brain drain, lack of financing, regional production represents sectors in crisis or hit by competition from emerging economies, etc.)

Source: elaborated based on the DigiBEST Basilicata Regional Study and Regional Innovation Scoreboard, 2020

Policy and support instruments

2019 was a turning point in the field of innovation for Italy - in addition to the efficient Ministry of Economic Development (MISE) and considering the need of a strong push for the digitalization of the country, the new Ministry of Technological Innovation and Digital Transition (MITD) has been established.[93] The MITD is in charge of the new strategy for innovation and digital transformation **Italia 2025** (Italy 2025). It describes a process of radical structural transformation in Italy, from digital infrastructure to public administration services; to collaboration between the public and the private sectors to generate innovation (Action Plan of the strategy covers 20 (+1) actions).

The current government has confirmed the maintenance of **National Industry 4.0 Plan** (with the possibility of modifying some measures) and renewed its support for the **Digital Growth Strategy** through an even more active political orientation. Also, there is a number of **national funding actions** to support **business development** and **initiatives for digital transformation of the SMEs production processes** offered by the MISE.

[89] The Ministry of economic development, *Official web-portal*. Retrieved from: https://bandaultralarga.italia.it/mappa/?entity=17

[90] European Commission (2019), *Regional Innovation Scoreboard Italy 2019*. Retrieved from: https://ec.europa.eu/docsroom/documents/36286

[91] European Commission (2020), *Basilicata profile*. Retrieved from: https://ec.europa.eu/growth/tools-databases/regional-innovation-monitor/base-profile/basilicata

[92] European Commission, *Digital Economy and Society Index (DESI) 2020 – Italy*. Retrieved from: https://ec.europa.eu/digital-single-market/en/scoreboard/italy

[93] Ministry of Technological Innovation and Digital Transition (2020). Retrieved from: https://innovazione.gov.it/

At the regional level, the **ERDF Operational Programme (OP) of the Region of Basilicata 2014-2020**, covering 9 priority axis, along with the **Smart Specialisation Strategy (RIS3) of Basilicata** are considered as the most important instruments to foster digital transformation of business. The ERDF OP is focusing on the development of regional research system and the capacity for innovation in Lucanian businesses with the RIS3 identified areas (strengthening the research infrastructures, investing in research and innovations, developing technological clusters, etc.) (axis 1); as well as the development of ICT infrastructure to ensure the "digital public administration" services and innovative services for citizens and the business world (e.g., electronic invoicing and payment) (axis 2).

In addition, ERDF OP Basilicata focuses on the competitiveness of the business sector (axis 3) by supporting new business, supporting existing business within the RIS3 areas; regeneration of local productive systems that are in the most difficult situation.

Key stakeholders

Table 10. List of the DigiBEST key stakeholders in Basilicata Region

Organizations	Role/function
Basilicata Region- Innovative Office	Regional authority (policy maker) (office dedicated to SMEs' innovation and digitalisation)
Basilicata Region- Managing Authority ERDF	Managing Authority for ERDF funds (policy maker)
Basilicata Region- Managing Authority ESF	Managing Authority for ESF funds (policy maker)
TeRN Consortium (Technologies for Earth Observation and Natural Risks)	Public/private consortium among SMEs, research entities and public administration aiming to create the regional technological cluster on Earth Observation for Natural risk prevention and mitigation (implements projects and actions promoting the Information and Knowledge Society)
IBAM CNR	Research centre for learning and ICT knowledge transfer
GEODESY SPACE CENTRE	Research centre for learning and ICT knowledge transfer
Confindustria Basilicata	General Confederation of Italian Industry, representing manufacturing and service companies in Basilicata
CNA (National Confederation of Crafts Sector and SMEs)	One of the trade organizations representing the enterprises of the crafts sector
Confapi Matera	Association of small and medium-sized industries, office of Matera Province (represents the needs and interests of the Italian SMEs)
Confapi Potenza	Association of small and medium-sized industries, office of Potenza Province (represents the needs and interests of the Italian SMEs)
CONFIDI (collective guarantee consortium of credit lines)	Consortium that carries out the provision of guarantees to facilitate companies in accessing short, medium and long-term loans for economic and productive activities.
Chamber of Commerce of Basilicata	Associates the companies of Basilicata to protect their collective interests (develops and improves national industry plans and digitalization project)
University Of Basilicata	Public university (transfer of know-how on digital skills)

In order to communicate with the stakeholders listed in the table, please refer to the contacts of Sviluppo Basilicata:

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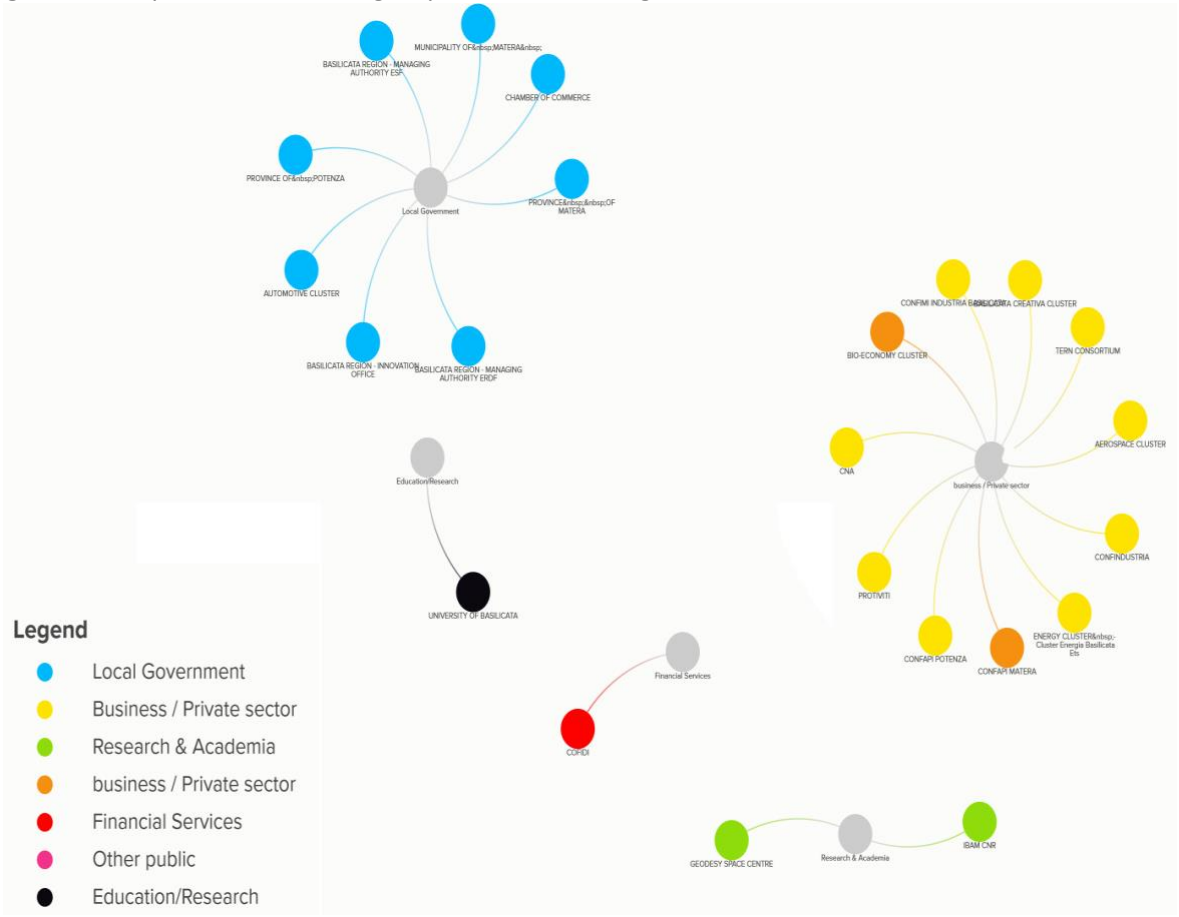
Internationalization Sector, territorial development and incubators,
t: +390971506652; skype: Orofino svlbasilicata; e: patrizia.orofino@sviluppobasilicata.it;
www.sviluppobasilicata.it

Figure 26. Map of Stakeholders' groups in Basilicata Region



Source: KUMU Map

4.1.4 Province of Granada (Andalucía Region, Spain) [94]

Population:	Granada Province: 919 700 (2% of Spain) (INE, 2019)
	Andalucía: 8 427 404 (18 % of Spain) (INE, 2019)
Territory:	Granada Province: 12 531 km^2 (2% of Spain)
	Andalucía: 87 597 km^2 (17 % of Spain)
Population density:	Granada Province: 72.99 inhabitants/km^2 (INE, 2019)
	Andalucía: 96.20 inhabitants/km^2 (INE, 2019)
GDP per capita:[95]	18 181 EUR (in Spain: 25 771 EUR) (INE, 2018)
Real GDP growth:	3,74% (Andalucía, 2018)
GDP PPS per capita	20 900 (Andalucía, 2018)
Unemployment rate:	Andalucía: 22.8% (ISCA, 2020); (EU 28: 6.3%, 2019)
ICT sector from GDP:	6%[96] (Spain: 3.28%, 2018)
Total R&D expenditure:	0.92% (GERD, Andalucía, % of GDP) (2018)
SMEs and microenterprises:	60 770[97] (Andalucía: 246.842, 2017)
Workforce working in the ICT sector:	3.6% (Spain, 2019)
Workforce working in SMEs and microenterprises:	778 389 (54%) work for SMEs and 653 439 (46%) work for microenterprises (Andalucía, 2017)

Source: Eurostat, if not indicated differently (Instituto Nacional de Estadistica (INE), DigiBEST Granada Province regional study, Institute of Statistics and Cartography of Andalusia (ISCA), Exploitation of the INE Labor Force Survey). PPS - Purchasing Power Standard. If data for Granada are n/a, Andalucía (NUTS 2) or Spain is indicated in the table

Location and structure

The Granada province (*Provincia de Granada*) is an autonomous community (*comunidad autónoma*) of Andalucía (NUTS 2), in southern Spain. It's located on the banks of the Mediterranean Sea and in the heart of the Penibética mountain range and borders the provinces of Málaga, Cordoba, Jaén, Albacete, Murcia, Almería. Its capital city is also called Granada.

It represents one of eight Andalusian provinces and consists of 174 municipalities and 6 local autonomic entities. The main administrative body is a Provincial Council of Granada – intermediate government with own competences – responsible for the planning, design and management of the provincial policies and strategies. It provides assistance to municipalities in helping SMEs (due to their limited capacities) and supports local SMEs directly.

Urban/rural population

In the province of Granada, 750 036 inhabitants (~82%) live in urban areas while 164 642 are living in rural areas (2019).[98]

[94] This chapter is elaborated based on the DigiBEST Regional Study of Granada Province (Provincial Council of Granada) and author's own information search (University of Latvia). Data on the demographic and economic performances are taken from Eurostat, if not indicated differently.

[95] For 2019, data from Instituto Nacional de Estadistica on GDP per capita are available only for Andalucía (19 633 EUR) and Spain (26 426 EUR).

[96] Granada Emprende (2020), *Why the New Technologies?* Retrieved from: http://www.granadaemprende.es/porque-las-nuevas-tecnologias-en-granada/

[97] INE (2020), *Empresas por provincia y condición jurídica*. Retrieved from: https://www.ine.es/jaxiT3/Datos.htm?t=302#!tabs-tabla

[98] Diputación de Granada (2020), *El 82% de la población de Granada vive en el Área Metropolitana y la Costa*. Retrieved from: https://www.andaluciarural.org/el-82-de-la-poblacion-de-granada-vive-en-el-area-metropolitana-y-la-costa/

The main population centres are Granada capital and its Metropolitan Area (55% of the territory), the Grenadian Coast (10.5%) with the municipalities of Motril and Almuñécar and the areas from the interior of Guadix, Baza and Loja.

Transport infrastructure

The Granada province is composed of the 23 143 km-long road network having an extensive connection and urban transport services, including motorways with connection to national capitals. Part of the roads belongs to the state, but part – to the Andalusian Government and local authorities. Although the road quality has improved over recent decades, there are still some areas that lack accessibility.[99] The other means of connections are high-speed national rail network, two international airports and port.

Figure 27. The province of Granada

Source: https://www.mapasmurales.es/municipios-granada/

Economic development and main sectors

30 out of the 200 poorest municipalities of Spain are located in the Granada province and they significantly differ from the richest metropolitan municipalities (e.g., the annual income of Granada city is 28 534 EUR per person, meanwhile the annual average income of the poorest municipality in the province Algarinejo is 12 778 EUR per person). Also, GDP of the Granada Province (19 190 EUR per inhabitant) is performing below the national one (26 430 EUR in 2019) according to Eurostat data.

The local economy is represented by the service sector (tertiary) that employs most of the people, followed by agriculture (primary), industry (secondary) and finally construction (secondary). The tourist sector in Granada province represents 14% of the GDP, with an annual turnover of more than 2.2 million EUR. 76% of non-agricultural companies in province belong to the service sector, whereas the greatest weight has the retail trade (except vehicles) representing 18.5% of the services sector businesses. [100]

[99] Junta de Andalucía, *Plan de Infraestructuras del Transporte y Movilidad de Andalucía (PITMA) 2021-2027* (page 1). Retrieved from: https://www.juntadeandalucia.es/export/drupaljda/doc_resumen_diagnostico_pitma_21_27.pdf

[100] Agaz Consultores (2010), *DipuDiagnóstico del tejido empresarial de Granada* (pag12). Retrieved from: https://www.granadaempresas.es/wp-content/uploads/2016/12/diagnostico-del-tejido-empresarial-de-la-provincia-de-granada-0.pdf,

The business sector is dominated by SMEs (99%),[101] thus performing below the Spanish and EU average. And there is a shortage of medium-sized companies, as the share of microenterprises in the province represents over 95% of the total enterprises. The provincial businesses make only 11.6% of the entire Andalusian business sector. [102]

Business internationalisation is at an incipient stage but on the rise. It is estimated that only 1.4% of firms are involved in export markets, compared to the national average of 8%[103].

The digital economy represents over 6% of the GDP of the province of Granada (higher than national average of 5.6%), and is particularly advanced in ICT, biotechnology and health industries. The Granada ICT industry represents more than 400 companies with more than 6 000 jobs and more than 7% of the province's GDP turnover. The ICT industry, BIO and eHealth sectors of Granada are the leading sectors on the Spanish markets with fast growing international exports, which receive national and international awards and recognitions. Although the private sector of Granada is quite digitally advanced there are still structural problems[104].

The sustained appearance of new companies that contributed to the job creation in Granada until 2018 has allowed the province to recover part of the productive sector which was lost during the difficult years of the economic recession (2008-2013). Despite the fact that Granada has experienced business growth after this period, it still hasn't reached the level that was before the crisis.

The pandemic of covid-19 facilitated increase of unemployment in most of the economic sectors, specifically in hospitality and ICT, meanwhile the commerce sector withstood the situation better, due to the activities of supermarkets, bakeries and other businesses which are considered essential for daily lives.

Digital infrastructure

There is a lack of the up-to-date data. Nevertheless, the latest available information from the Strategy of Telecommunications Infrastructure of Andalucía 2020 discusses a significant diversity in the available levels of connection and lack of high-speed broadband infrastructure, which is lower than in most of Spain. The centres with the lowest population have lower coverage level (basic broadband ADSL 1Mbps and 3G accesses are present in the centres with a population under 1 000 inhabitants (90%)). Fibre and cable-based access technologies delivering ultrafast broadband (100Mbps) are present only in cities with inhabitants over 100 000. [105]

Data of the Regional Innovation Scoreboard (2019) are available at the level of Andalucía region (NUTS 2). The region is acting as a Moderate Innovator where innovation performance has increased over time (2.5%).[106]

Spain is among the most digital countries in Europe. However, it scores badly in speed broadband connectivity, but much better on internet use, business digitisation and digital public services. Spain

[101] Junta de Andalucía, *2020 Digital Business Plan. PAED* (page 8), datas from June 2015. Retrieved from: https://www.juntadeandalucia.es/export/drupaljda/Memoria%20Plan%20EmpresaDigital.pdf

[102] Junta de Andalucía, 2020 Digital Business Plan. PAED (page 8), datas from June 2015. Retrieved from: https://www.juntadeandalucia.es/export/drupaljda/Memoria%20Plan%20EmpresaDigital.pdf

[103] Empresa Exterior (2019), *Solo el 8% de las empresas españolas tiene actividad internacional*. Retrieved from: https://empresaexterior.com/art/70654/solo-el-8-de-las-empresas-espanolas-tiene-actividad-internacional

[104] Granada Emprende (2020), *Why the New Technologies?* Retrieved from: http://www.granadaemprende.es/porque-las-nuevas-tecnologias-en-granada/

[105] Junta de Andalucia (2020), *Estrategia de infraestructuras de telecomunicaciones de Andalucia 2020* (page 17). Retrieved from: https://www.juntadeandalucia.es/export/drupaljda/esita_2020.pdf

[106] European Commission (2019), *RIS 2019*. Retrieved from: https://ec.europa.eu/growth/industry/policy/innovation/regional_en

is under average on digital skills.[107] Since 2015 the DESI Index has constantly grown and in 2020 it has reached 57.5 (11th rank), above the EU average.[108]

Policy and support instruments

The digital transformation of SMEs in Granada province is mainly fostered under the regional and national level strategies and instruments.

Digital Spain 2025 is a national strategy where ~ 50 measures of ten strategic axes intended to promote the country's digital transformation process, in line with the digital strategy of the EU, including focus on the digitization of companies, digital skills, connectivity, digitization of the production model through digital transformation driving projects in strategic economic sector, etc. Part of the Digital Spain is also a Public Administrations Digitization Plan establishing guiding principles, objectives and actions, as well as the gradual development milestones of the Digital Administration until 2025.

The national strategy Connected Industry 4.0 (CI 4.0), to support the industrial sector in Spain with the help of the local digital solutions, defines a plan with four action lines – awareness and training; collaborative environments and platforms; boost of the digital enablers, and support for digital evolution in the industry, whereas the Strategy for the Promotion of Industry 4.0 was developed for the Central and Autonomous Administrations. Andalucía is using it as a tool for implementation of the awareness rising initiatives.

At the regional level, the Andalusian Industrial Strategy and the Strategy for the Promotion of the ICT Sector Andalucía (TIC 2020) are implementing such instruments as "Industry 4.0 Working Group" for the development of identified opportunities within the Industry 4.0 and "Digital Business Action Plan".

Digital Business Action Plan **(PAED 2020)** is the roadmap of activities to promote digital transformation of SMEs in Andalucía and their incorporation into the digital economy - 27 measures of the PAED are focusing on the 3 strategic axes: 1) dissemination and awareness on the benefits of digital solutions, 2) increase of digital skills, and 3) boost of digitalisation (strategy, innovation, cooperation).

Currently there is ongoing work on the reformulation of the priorities **for the new the Andalusian Innovation Strategy** (RIS3 Andalucía) for period **2021-2027**.[109] The previous RIS3 Andalucía 2020 included priority (one of nine) on the ICT sector and digital economy with the dimensions to improve infrastructure, create the innovative and employment generating SMEs, to enable technologies, knowledge, networking, etc.

In addition, Council of the Granada Province can operate with the Program of Assistance and Cooperation for Local Economic Promotion to help local business in digitalisation process though its programme "Assistance to municipal policies to support entrepreneurs and businesses" offering free advice on start, development and consolidation of business (including digitalisation).

The most important challenges of Granada Province are related to the absence of business culture to understand the advantages of digitalization, no awareness about the available solutions for the business processes automation, lack of digitalization strategies at the management levels and lack of commercial vision of ICT businesses. Digital transformation is considered as an expensive investment (no annual budget allocation).

[107] Junta de Andalucía, *2020 Digital Business Plan. PAED* (page 11), datas from June 2015. Retrieved from: https://www.juntadeandalucia.es/export/drupaljda/Memoria%20Plan%20EmpresaDigital.pdf

[108] European Commission (2020), *Desi index Spain*. Retrieved from: https://ec.europa.eu/digital-single-market/en/scoreboard/spain

[109] Smart Specialisation Platform (2020), *Involving regional stakeholders in the Smart Specialisation Strategy mid-term review*. Retrieved from: https://s3platform.jrc.ec.europa.eu/-/smart-story-andalucia-ris3-mid-term-evaluation?inheritRedirect=true

Local micro and SMEs often lack technological skills and capacity to introduce IT solutions (basic websites with old fashion design) and only few businesses (30%, mostly within the hotel industry, less - agriculture) are using e-commerce possibilities. Due to the fear family micro-SMEs have no intention to change their business processes.

Another challenge is related to the lack of cooperation culture between the micro and SMEs (only few cooperatives to tackle the global market), difficulty in accessing funding through the available projects and programs, lack of flexibility of technology suppliers with the SMEs (supply do not meet demand) and low implementation of digital security and data protection.

And finally, there is a limited access to basic infrastructures, broadband network and use of ERP (enterprises resources planification) tools, and the low use of Internet by households (below the European average).

Source: elaborated based on the DigiBEST Granada Regional Study

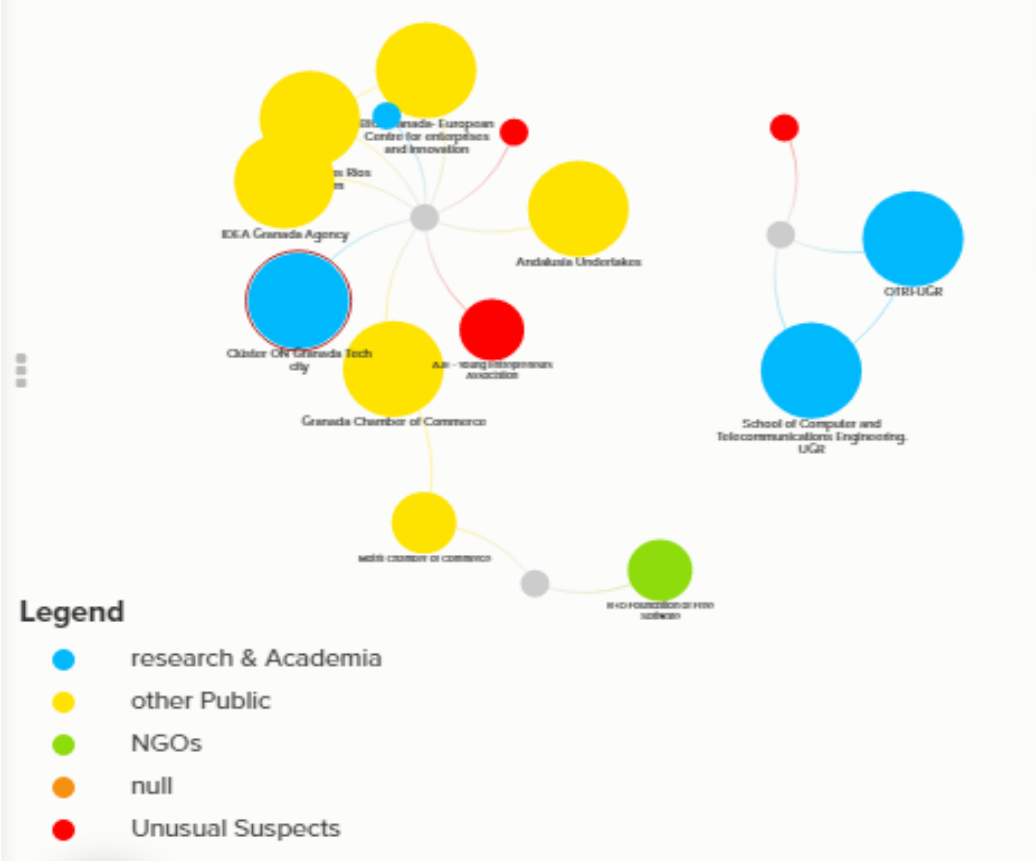
Key stakeholders

Table 11. List of the DigiBEST key stakeholders in Province of Granada

Organizations	Role/function
Provincial Council of Granada	Provincial authority that meets every municipality in the province of Granada (policy maker)
Chamber of Commerce of Granada	Local association of business managers (support for business, including projects on SME's digital transformation)
Ofcina de Transferencia de Resultados de Investigación (OTRI) – Universidad de Granada	Promotes collaboration between the University of Granada and businesses to carry out R & D & I projects (formalises)
Cluster de la Construcción Sostenible de Andalucía	Public association with an integrative and multisector core, combining the principles of energy efficiency, renewable energies and innovation as central elements for change
Clúster tecnológico y biotecnológico ON Granada Tech city	Business organization in the digital economy and the largest technology and biotechnology cluster in Andalucía
Fundación I+D del Software Libre	Non-profit entity and a R & D Centre focused on ICT
Consorcio Fernando de los Rios	Implements projects and actions that promoting the Information and Knowledge Society among citizens in Andalucía
BIC Granada- Centro Europeo de Empresas e Innovación	Space of exchange both for researchers, who want to transfer their knowledge to society, and for entrepreneurs who want to innovate
Agencia IDEA Granada	Support for Andalusian entrepreneurship (management and granting of incentives)
AJE - Asociación de Jóvenes Empresarios	Promotes the development of Granada business (defending and representing interests of young entrepreneurs)
Cámara de Comercio de Motril	Local association of business managers (support for business, including projects on SME's digital transformation)
Andalucía Emprende (Junta de Andalucía)	Promotion of the entrepreneurship and business development
Smart Agrifood Startups	Start-up acceleration program based on a mentoring and a methodology contrasted, to facilitate accelerated learning
ETS Ingenierías Informática y de Telecomunicación	Learning and ICT knowledge transfer
Círculo Tecnológico de Granada	Provincial employer providing tools to achieve common objectives for the ICT and Biotic sectors

In order to communicate with the stakeholders, please contact DigiBEST team at the Granada County Council: https://www.interregeurope.eu/digibest/contacts/

Figure 28. Map of Stakeholders' groups in Granada



Source: KUMU Map

4.1.5 The Republic of Austria[110]

Population:	8.86 million (2019)
Territory:	83 879 km^2
Population density:	107.6 inhabitants/km^2 (2019)
GDP per capita:	44 780 EUR (Statistics Austria, 2019)
Real GDP growth:	1.4% (Statistics Austria, 2019)
GDP PPS per capita	39 400 (2018)
Unemployment rate:	4.7% (Statistics Austria, 2019) (EU28 average: 6.2%, 2019)
ICT sector from GDP:	3.58% (2018)
Total R&D expenditure:	3.14% (GERD, % of GDP in 2018)
SMEs and microenterprises:	238 846 (2017)
Workforce working in the ICT sector:	4.3% (2019)
Workforce working in SMEs and microenterprises:	2 387 227 (75%) work for SMEs and 776 478 (25%) work for micro enterprises (2017)

Source: Eurostat, if not indicated differently (Statistics Austria). PPS – Purchasing Power Standard

Location and structure

The Republic of Austria (*Republik Österreich*) is a landlocked East Alpine country in the southern part of Central Europe. It is bordered by the Czech Republic (north), Slovakia (northeast), Hungary (east), Slovenia and Italy (south), Switzerland and Liechtenstein (west), and Germany (northwest).

Austria is a federal republic composed of nine independent federal states (*Länder, Bundesländer*): Vienna, Lower Austria, Upper Austria, Styria, Tyrol, Carinthia, Salzburg, Vorarlberg and Burgenland. Vienna also is Austria's capital and its largest city (over 1.9 million as of 1 Jan 2020[111]). It is a parliamentary representative democracy with a directly elected Federal President as head of state and a Chancellor as head of the federal government.

Urban/rural area

Being a mountainous country Austria is highly urbanized – 58% (over 5.1 million) of the population lives in the urban areas (as of 1 Jan 2020).[112]

Transport infrastructure

It has a highly developed transportation infrastructure – controlled access highways (autobahn system), passenger and freight trains (more than half of the track is electrified), waterways (4 ports, Danube river connection between Germany and the Black Sea), and air services (6 airports for international flights).[113] [114] [115] Also, Austria is having one of the largest investments in transport infrastructure in the EU.[116]

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[110] Information about Austria is provided on the national level. This chapter is elaborated based on the DigiBEST Regional Study of Austria (by the AWS) and own author's information search (University of Latvia). Data on demographic and economic performances are taken from Eurostat, if not indicated differently.

[111] Statistics Vienna (2020), *Vienna in Figures 2020.* Retrieved from: https://www.wien.gv.at/statistik/pdf/viennainfigures-2020.pdf

[112] Statistics Austria (2020), *Classifications of urban and rural areas*. Retrieved from: https://www.statistik.at/web_en/classifications/regional_breakdown/urban_rural/index.html

[113] Britannica, *Transportation and telecommunications*. Retrieved from: https://www.britannica.com/place/Austria/Transportation-and-telecommunications

[114] Austria.info, Flights. Retrieved from: https://www.austria.info/en/service-and-facts/getting-there-around/flights

[115] Ports, *ports in Austria*. Retrieved from: http://ports.com/browse/europe/austria/

[116] European Commission (2020), *Austria - Investments and infrastructure*. Retrieved from: https://ec.europa.eu/transport/facts-fundings/scoreboard/countries/austria/investments-infrastructure_en

Economic development and main sectors

Austria is one of the richest countries in the world with a high standard of living (e.g., in 2019 it was ranked 20th in the world in the Human Development Index [117]). Also, Vienna consistently ranks in the top internationally on quality-of-life indicators.

It is a highly developed industrialized country with an important service sector. The main industries are food and luxury commodities, mechanical engineering and steel construction, chemicals, and vehicle manufacturing. In agriculture (which employs a small portion of the GDP), Austria is witnessing a trend towards organic farming – with an overall share of 22%, organic farms in Austria occupy a leading position among the EU Member States. Iron ore, non-ferrous metals, important minerals and earths are among the most important natural resources. The growth of the industrial sector increasingly requires supplementary imports. This is also true of fuels, energy resources, and the electricity-generating industry. Austria has its own resources of petroleum and natural gas. The generation of hydroelectric power is constantly being expanded, with Austria in the lead in the field of hydroelectric power in the EU.[118] [119]

Austria's industrial and commercial sectors are characterized by a high proportion of SMEs. In 2019, 93.6% (504 112) of companies represented microenterprises (up to 9 employees), 5.1% (27 662) – small enterprises (10-49 employees) and 1% (5 513) – medium-size enterprises, whereas only 0.2% have 250+ employees. [120] The start-ups' scene focusing on innovative, ICT-oriented start-ups and the support measures for start-ups have developed considerably during the last years.

Figure 29. Map of Austria

Source: Encyclopædia Britannica

[117] United Nations Development Program, *Human Development Index (HDI) Ranking*. Retrieved from: http://hdr.undp.org/en/content/latest-human-development-index-ranking

[118] Austrian Embassy, *Economy*. Retreived from: https://www.austria.org/economy

[119] Britannica, *Economy*. Retrieved https://www.britannica.com/place/Austria/Languages#ref33397

[120] https://wko.at/statistik/kmu/GK_BeschStat_GW.pdf?_ga=2.187935784.1849194039.1613072275-709192788.1613072275

Digital infrastructure

In terms of the connectivity dimension, Austria ranks only 22nd, below the EU average (DESI, 2020). It performs very well with 98% of households' average coverage in 4G. On the other side, Austria has a low coverage with very high-capacity networks (14% in 2019). The coverage in fixed broadband with speed >100 Mbps has markedly increased over the last years – with 29% it is above EU average now. Broadband prices, both for fixed as for mobile, are below EU average which might be the reason for the increasing mobile broadband take-up.[121] At the beginning of 2021, Austria will be the 5G pilot country and it is planned by 2025 to reach the nationwide supply of gigabit connections.[122]

As of general DESI index, Austria is ranking 13th among the EU members and remains slightly above the EU average – scoring 54.3 (in 2020).[123]

According to European Innovation Scoreboard 2020, Austria as a Strong Innovator has leading positions in innovations in SMEs (high shares of SMEs with innovative products and business processes). [124]

Policy and support instruments

The digital transformation in Austria is considered as a high priority in the government programme, where it is promoted by the Federal Ministry for Digital and Economic Affairs (BMWD).

In 2019, the development of a Digital Austria in 2050 vision – as a starting point and framework for the overall Digitisation Strategy ("strategic action plan") – under the BMWD has started. It will harmonise existing and replace partly outdated strategies (e.g., **Digital Roadmap Austria** covering 12 guiding principles and incorporates ~150 specific measures in twelve areas of action). Fostering the digital transformation in selected priority topics (data, climate and environment protection etc.) and the further improvement of modern e-government services for the business sector, as well as for citizens. [125]

The BMWD is also implementing **Digital Austria Initiative**[126] which focuses on the support of the economy with digital services, the creation of a digitalization-friendly environment to promote digital innovation as well as on the expansion and simplification of the digital services for all citizens (e.g. the eGovernment platform „oesterreich.gv.at"[127], digital office app "Digitales Amt").

The platform **Digital Austria** was launched to provide an overview in the modern way of the **Digital Action Plan Austria** as well as offer SMEs relevant information and an overview of government support schemes.

Austrian Smart specialization strategy is focusing on the 7 thematic investment priorities, where one of them is ICT. Also, each region of Austria has its local RIS3 strategy.[128] Federal government has developed an easy-to-use tool **RIS3 KEY** in order to promote Smart Specialisation concept among regional players and mobilise institutions and regional policy makers.

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[121] European Commission (2020), *DESI Austria 2020*. Retrieved from: https://ec.europa.eu/digital-single-market/en/news/digital-economy-and-society-index-desi-2020

[122] Federal Ministry Republic of Austria, *For companies*. Retrieved from: https://www.bmdw.gv.at/en/Topics/Digitalisation/For-companies.html

[123] European Commission, *The Digital Economy and Society Index (DESI*). Retrieved from: https://ec.europa.eu/digital-single-market/en/digital-economy-and-society-index-desi

[124] European Commission (2020), *European Innovation Scoreboard 2020*. Retrieved from: https://ec.europa.eu/commission/presscorner/detail/en/QANDA_20_1150

[125] European Commission (2020), *Digital Public Administration factsheet 2020 Austria*. Retrieved from: https://joinup.ec.europa.eu/sites/default/files/inline-files/Digital_Public_Administration_Factsheets_Austria_vFINAL_2.pdf

[126] For more information see: Federal Ministry Republic of Austria, *Digital Austria*. Retrieved from: https://www.bmdw.gv.at/en/Topics/Digitalisation/Strategy/Digital-Austria.html; https://www.digitalaustria.gv.at/

[127] One stop platform with most important public services, where the services for SMEs and start-ups are constantly expanded.

[128] European Commission, *Smart Specialisation Platform*. Retrieved from: https://s3platform.jrc.ec.europa.eu/regions/at

Following the Broadband Strategy 2020 (aimed at the ultrafast broadband building in the country), Austria has designed a **Broadband Strategy 2030** to achieve nationwide coverage with Gigabit-capable broadband (1Gbps) services by the end of 2030 and to close connectivity gaps, especially in rural areas.

The stakeholder consultation for the national artificial intelligence strategy, **Artificial Intelligence Mission Austria 2030**, has been completed. It will focus on the seven priority fields, including AI in the economy/industry.

Also at the regional level, Austrian provinces have their strategies or programmes (e.g. Guideline Digitization Upper Austria, programme "Digital Starter Upgrade" (2020)

Other important support instruments that can be used to facilitate digital transformation of the business sector: **Digital Competence Framework for Austria - DigComp 2.2 AT** available at the platform **„**fit4internet" – aiming at the promotion of digital skills by testing digitals skills at the individual level; **„**Jump Start**"** – support programme for accelerators, incubators and their incubated start-ups (for innovative and technology-oriented business ideas); **„**KMU Digital" – comprehensive support programme for SMEs providing consultations and financial co-financing for investments in new technologies and digitalization; Digital Innovation Hubs; Austrian **One-Stop e-Government Portal for businesses** (USP – *Unternehmensserviceportal*) *offering* ~ 50 e-Government services for companies[129] on a website with a single sign-in, including public tenders from over 7.000 authorities.

In the wake of the **pandemic**, Austria has taken a large number of measures in the digital sector: chatbots informing about COVID-19 and subsidies for companies facilitating cybersecurity (informing about COVID-themed phishing or malware emails and fake shops); introduced a nationwide platform promoting Austrian online-sales. In addition, the BMWD initiated a project Digital Team Austria**,** uniting enterprises from the digital sector on a voluntary basis, to provide digital solutions for SMEs (video conferences & online meetings; communication & collaboration, cyber security; internet assess; digital services for working, learning and everyday life), free of charge for at least 3 months.

As the most important challenges in the digital transformation process are considered a low usage of digital technologies in SMEs due to the lack of resources (specifically Cloud and Big Data); lack of funding opportunities (e.g., for the implementation phase after SMEs participate in the subsidised trainings, consultations or pilot projects – loans, venture capitals); lack of ICT-infrastructure in (vocational) schools and training institutions, lack of ICT-qualified trainers; unwillingness of management to invest in digital projects, lack of ICT-skills, the low rate of ICT students.

There is also an information and communication deficit to convince SMEs to digitally transform. Besides, the support programmes are considered too bureaucratic (prepossession of bureaucracy).

Among other challenges – lack of ultra-high-speed broadband; lack of governmental trust to ICT innovations developed by star-ups; only few ICT start-ups cooperate with bigger companies, thus limiting transfer of the ICT knowledge and existing solutions into the work organisation of other companies.

Source: elaborated based on the DigiBEST Regional Study of Austria

[129] European Commission (2018b), *eGovernment in Austria (May 2018),* Luxembourg. Available at: https://joinup.ec.europa.eu/sites/default/files/inline-files/eGovernment_in_Austria_2018_vFINAL.pdf

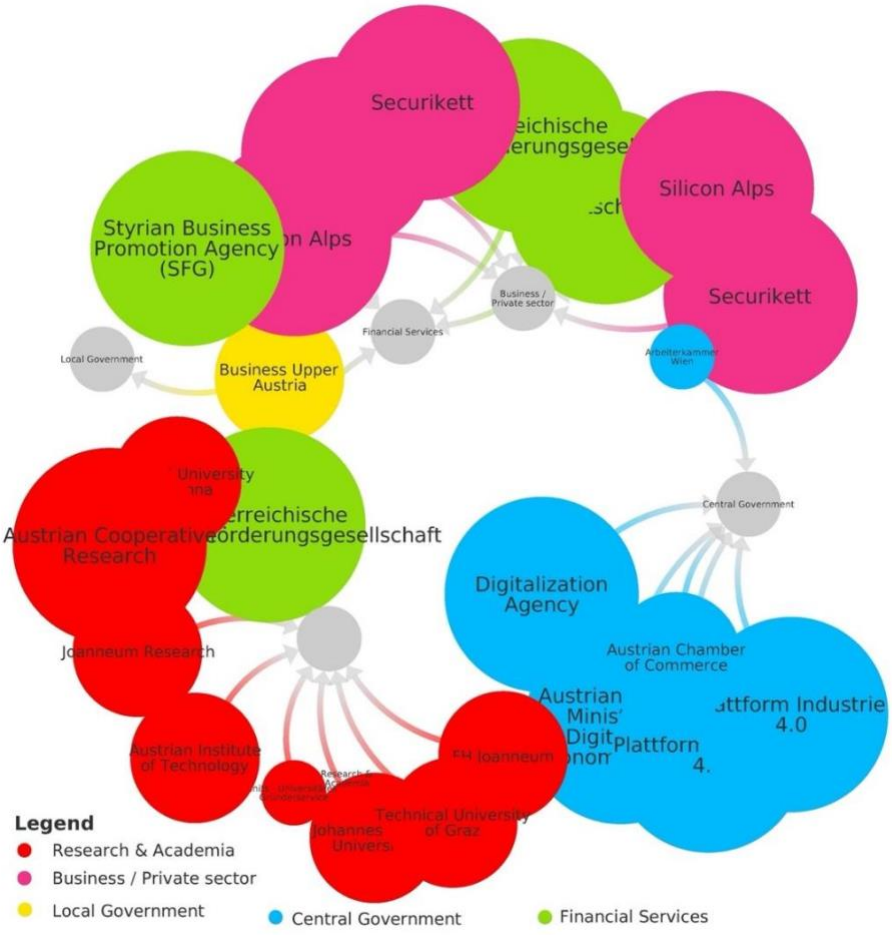
Key stakeholders

Table 12. List of the DigiBEST key stakeholders in Austria

Organizations	Role/function
Austrian Federal Ministry of Digital and Economic Affairs	National managing authority (promotion and coordination of digitalization/digital transformation)
Austrian Chamber of Commerce	Represents the interests of Austrian companies (offers a wide range of services, and supports Austrian companies with their know-how)
Business Upper Austria	Business agency of the Upper Austrian government - one-stop shop contact point (location development & settlement of companies, cooperation and public funding advisory services)
Styrian Business Promotion Agency (SFG)	Offers information and consultation services for firms, as well as funding opportunities
Platform Industrie 4.0	Membership-based an association of organisations (industry, science, policy makers, employers and employees) promoting digitisation of Austrian industry
Austrian Institute of Technology	Largest non-university research institution in many of the research areas
Johannes Kepler Universität	A public university in Linz, the capital of Upper Austria
FH Joanneum	FH JOANNEUM University of applied Sciences in Graz
Inits - Universitäres Gründerservice	Vienna's High-Tech Incubator- business incubator and hub for technology start-ups
Chamber of Labour for Vienna	The Chamber of Labour serves the interests of its members-employees (over 3 million people)
Securikett	One of the leading companies in the field of product and brand protection
Austrian Cooperative Research	Network of private research institutes (applied R&D tailored to the needs of SMEs)
Joanneum Research	Nationally and internationally research institution owned by the Austrian federal states of Styria, Carinthia and Burgenland
Qoncept	Company active in the field of metallurgy and IT, with experience over 15 years
Technical University of Vienna	Austria's largest research and educational institution in the field of technology and natural sciences
Silicon Alps (Austrian technology and innovation cluster for electronic based systems)	Public-private partnership between Austrian industry, science and public authorities to develop and position the electronics and microelectronics sector with a regional focus in the Carinthia and Styria
Technical University of Graz	Public university
Austria Wirtschaftsservice	Promotional bank with aim of boosting innovation & growth
Austrian Research and Promotion Agency	The national funding agency for industrial research and development

In order to communicate with the stakeholders, please contact DigiBEST team at the Austria Wirtschaftsservice Gesellschaft mbH (AWS): https://www.aws.at/digital-business-ecosystem-transformation-digibest/

Figure 30. Map of Stakeholders' groups in Austria (position on Digitalisation)



Source: KUMU Map

4.1.6 Tâmega e Sousa (Portugal) [130]

Population:	Tâmega e Sousa: 415 989 (4.04% of Portugal) (INE, 2019)
	Norte: 3 575 338 (34.73% of Portugal) (INE, 2019)
Territory:	Tâmega e Sousa: 1 832 km² (1.96% of Portugal) (INE, 2019)
	Norte: 21 278 km² (22.1% of Portugal)
Population density:	Tâmega e Sousa: 227.5 inhabitants/km² (INE, 2019)
	Norte: 167.9 inhabitants/km² (INE, 2019)
GDP per capita:	16 900 EUR (in Norte) (Portugal: 19 800 EUR) (2018)
Real GDP growth:	2.2% (Portugal, 2019)
GDP PPS per capita	20 200 (Norte, 2018)
Unemployment rate:	5.4% (Norte, 2019) (EU28: 6.3%, 2019)
ICT sector from GDP:	N/a
Total R&D expenditure:	1.53% (GERD, Norte, % of GDP in 2018)
SMEs and microenterprises:	125 700 (Norte, 2017)
Workforce working in the ICT sector:	3.6% (Portugal, 2019)
Workforce working in SMEs and microenterprises:	713 960 (70%) work for SMEs and 305 917 (30%) work for microenterprises (Norte, 2017)

Source: Eurostat, if not indicated differently (Portugal Statistics (*Nacional de Estatística* – INE)). If data for Tâmega e Sousa are n/a, Norte Region (NUTS 2) or Portugal is indicated in the table. PPS - Purchasing Power Standard

Location and structure

Tâmega e Sousa is a Portuguese statistical sub-region (NUTS 3) located in the Northern Region (Norte Region, NUTS 2) and composed of 11 municipalities. It borders Ave (on the north), Douro (east), Viseu Dão-Lafões (south) and Porto Metropolitan Area (west).

The Tâmega e Sousa Intermunicipal Community (*Comunidade Intermunicipal*, CIM-TS) is a type of administrative entity in Portugal of an associative nature and territorial scope. The task of the entity is to promote the interests of the included municipalities – strategic, economic, social, environmental and infrastructural and territorial management.[131]

Urban/rural population

The sub-region area covers the coast - more urban and industrially developed, and the inland - more rural and economically depressed. It is characterized by the increasing concentration of population in urban centres and the depopulation of rural and remote areas, similarly to the rest of the country. With the exception of some municipalities, most have population density higher than the national average.[132] The 90.4% (376 176) of the Tâmega e Sousa population lives in the predominantly and medium urban areas and only 9.6% (39 813) - lives in predominantly rural areas (2019).[133] The sub-

[130] Regional profile is elaborated based on the DigiBEST Regional Study of the Tâmega e Sousa (by the Intermunicipal Community of Tâmega e Sousa) and own author's information search (University of Latvia). Data on the demographic and economic performances are taken from Eurostat, if not indicated differently.

[131] Since the local government reform in 2013, there are 21 intermunicipal communities. Since January 2015, Tâmega e Sousa is also a NUTS 3 subregion of Norte Region, that covers the same area as the intermunicipal community.

[132] Atlas of the Internationalization of Tâmega e Sousa (2019); Intermunicipal Community of Tâmega e Sousa (coord.); Finance XXI Consulting, pp.12-15.

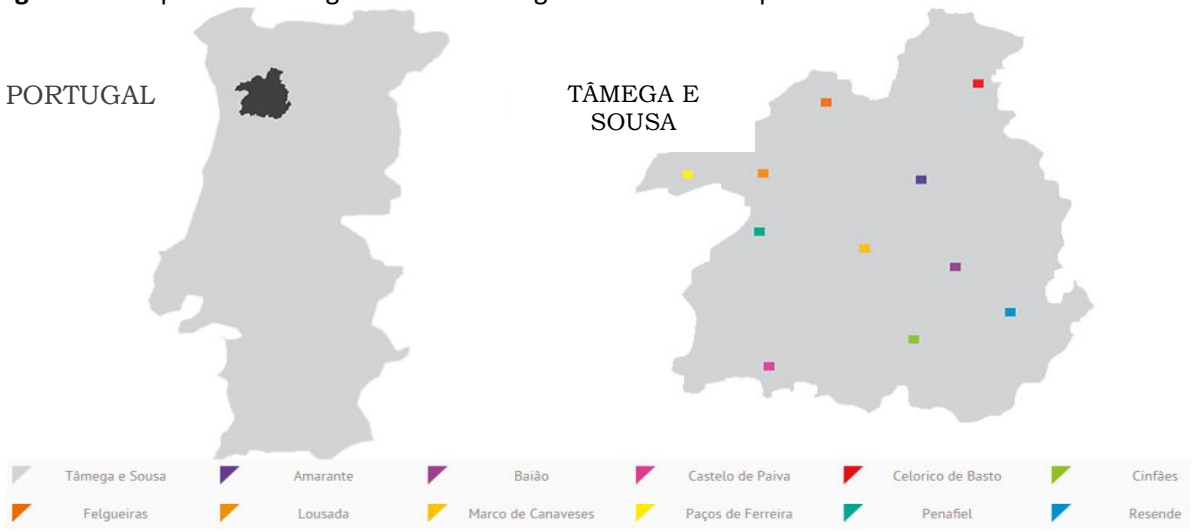
[133] Statistics Portugal, *Resident population (No.) by Place of residence (NUTS - 2013), Sex and Urban areas typology*. Retrieved from: http://www.ine.pt/xurl/ind/0008856

region is accounting for 4% of the Portuguese population and ~ 12% of the North region, one of the youngest populations of the country.[134]

Transport infrastructure

The region is served by a road (number of motorways) connecting with the city of Porto (to the west) and to the interior of the North Region and Spain (to the east) as well as the rail network that takes a predominantly east-west direction, serving connection from Porto to Marco de Canaveses and to the municipality of Baião.

Figure 31. Map of the Tâmega e Sousa sub-region and its municipalities



Source: http://www.cimtamegaesousa.pt

Economic development and main sectors

The economic profile of *Tâmega e Sousa* clearly differs from the national one and North Region. It is weaker in terms of GDP and labour productivity, due to the low expression of high added value services or to its specialization in the manufacturing industry.

Based on the Regional Accounts (INE) data[135], there is a relative weight of the secondary sector that is much higher than in the region and country. Whereas the primary and tertiarization sectors still have lower weight comparing both territory levels. In addition to its strong specialization in the secondary sector, the other feature of the Tâmega e Sousa, and entire Norte region, economy is its strong contribution into the international trade in tradable goods, such as footwear, textile and apparel, furniture, metalworking, construction and materials or green wine - "vinho verde"[136].

Although the business environment is dominated by SMEs, there are large industrial units, generally associated with large foreign investments. The textile industry, in particular footwear, represents a huge engine for industrial development, allowing it a prominent place at regional and national level. The territory also includes the most successful wood and furniture cluster in Portugal. The foreign investments of the Norte Region are also characterised by increase, specifically in the agri-food and civil construction.[137]

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[134] Statistics Portugal, *Resident population (No.) by Place of residence (NUTS - 2013), Sex and Age group (By life cycles).* Retrieved from: http://www.ine.pt/xurl/ind/0008272

[135] National Statistical Institute, available for consultancy: https://www.ine.pt/xportal/xmain?xpid=INE&xpgid=ine_main

[136] Tâmega e Sousa INVEST (2019), Intermunicipal Community of Tâmega e Sousa, pp. 1-19.

[137] Comissão de cooordenação e desenvolvimento regional do Norte, *RIS3 Norte 2020*. Retrieved from: https://norte2020.pt/sites/default/files/public/uploads/documentos/norte2020_ris3.pdf

Digital Infrastructure

As there is no separate information related to digital infrastructure in Tâmega e Sousa, the section represents regional or national insight.

In terms of DESI Index 2020, Portugal continues to perform below the EU28 (52.6), ranking 19th with the score 49.9, although its score has increased over the last few years. [138]

As of the connectivity dimension, overall fixed broadband availability rose from 74% in 2018 to 75% in 2019, narrowing the gap with the EU average (78%). Portugal has a strong position (12th) in a good broadband coverage: VHCN – 83% (the EU average: 44%) and NGA broadband – 83% (close to the EU average), as well as in the take up (2nd) of at least 100 Mbps fixed broadband– 56% (the EU average: 26%). It continues to lag behind the EU average on mobile broadband availability despite the substantial improvement (from 70 subscriptions per 100 people in 2018 to 76 in 2019).

Considering the Regional Innovation Scoreboard 2019, Norte Regional is classified as Strong – Innovator, where innovation performance has increased over time (13.8%).

Policy and support instruments

The digital transformation is considered essential by the Portuguese government. There is no directly specialised sub-regional strategy, however digital transformation is fostered through the national and regional policy documents and support programmes.

Currently, as the main policy document is regarded a national strategy **Indústria 4.0** (*2017-in progress*), as a part of the National Strategy for the Digitisation of the Economy, to promote innovation and digitalisation in key strategic sectors across the country (60-point action plan with 3 strategic lines – digitalisation, innovation and training); and the financial instrument – **Operational Programme, Growth and Employment 2014 - 2020"**.

In order to tackle a problem of low digital literacy, the **National Initiative for Digital Competences e.2030** (Portugal INCoDe.2030) was launched under the Portugal 2020 financial support by the Portuguese Prime Minister (2017). Programme is containing 5 lines (axis) of action (inclusion, education, qualification, specialisation and research) to foster digital skills of Portuguese population and to place Portugal at the top of the European countries in digital competences. Besides, under the INCoDe.2030, the **National AI Strategy 2030** (2019) was defined to strengthen the basic ICT skills of the population preparing it for emerging and digital-based employment opportunities.

Recently (2020), the **Action Plan for the Digital Transition** was prepared by the Ministry of Economy and Digital Transition to facilitate further digital opportunities for citizens, digital transformation for companies and digitization of the State. Among specific measures for SMEs – Digital Indoor SME Capacity Building Programme +CO3SO Digital, and Digital Innovation Hubs for Entrepreneurship.

At the regional level, North Portugal Regional Operational Programme 2014–2020 (**NORTE 2020**), as a part of PORTUGAL 2020, foresees the financing support for projects strengthening digital economy, investment in ICT, consulting in the field of digital economy, technological support (Axis 2 – Competitiveness of SMEs) and its incentives scheme for employment and entrepreneurship - SI2E.

Portugal has taken a number of digital measures to cope with the Covid19. For the economy, digital platforms were set up in order to support SMEs that continued open during the crisis and to coordinate the hotel occupation to support COVID-19 health professionals.[139]

The main challenges of the Tâmega e Sousa (Norte Region) are related to the fragmented and small business sector; low level of digital literacy (one of the lowest in the EU); insufficient knowledge of SME managers and a shortage of qualified professionals to deal with digitalisation

[138] European Commission, *DESI 2020 Portugal*. Retrieved from: https://ec.europa.eu/digital-single-market/en/scoreboard/portugal

[139] European Commission, *DESI 2020 Portugal*. Retrieved from: https://ec.europa.eu/digital-single-market/en/scoreboard/portugal

challenges; low integration of e-commerce; lack of finances and heightened fear of using bank credit to invest in the new technologies as well as an absence of cooperation culture in companies within the same sector.

An old-fashioned public administration; slow implementation of IT changes in Portugal (e.g., in the availability of digital services in the public sector) and lack of the measures to deal with it.

Source: elaborated based on the DigiBEST Tâmega e Sousa Regional Study

Key stakeholders

Table 13. List of the DigiBEST key stakeholders in Tâmega e Sousa

Organization	Role/function
CIM do Tâmega e Sousa	Regional authority (policy maker)
IAPMEI	National agency promoting competitiveness and business growth (financial and technical instruments)
AMA - Administrative Modernization Agency	National agency carrying out the tasks of the Ministry for the Modernisation of the State and Public Administration (responsible for modernising and simplifying administration and e-government)
Conselho Empresarial do Tâmega e Sousa/Business Council of the Tâmega and Sousa	Facilitates a homogeneous and sustained development (the study, defence and promotion of enterprises and socio-economic interests of the Tâmega sub-Region)
The Escola Superior de Tecnologia e Gestão/ High School of Technology and Management	Public university in Tâmega e Sousa (with prestige recognised at national and international levels)
DOLMEN - Desenvolvimento Regional e Local, crl	Local entity promoting the development of the region
IET - Enterprise Institute of Tâmega	Non-profit association under private law of a scientific and technical nature (promotes greater business dynamics)
AEP – Penafiel Business Association	Non-profit entity representing business activity and economic agents (representation and defence of the interests)
MOVELTEX– Centre for Competence and Incubation of Companies	Boosting the development and growth of the furniture, clothing and textile industries in the municipality of Paços de Ferreira
ADER - SOUSA	Local private rural development association of Terras do Sousa
AEP – Portuguese Business Association	Developing and improving national industry
Academia de Design e Calçado / Vocational Training Centre for shoe industry	Provides solutions to the industry's shortcomings – vocational training and is based on contributing to the progress of the Portuguese business system
Centro de Formação da Metalomecânica /Vocational Training Centre of the Metal Industry	Promotes the training, guidance and professional development of Human Resources in the Metallurgical, Metalworking and Electromechanical Sector
AMBT – Baixo Tamega Municipalities Association	Creates and underpins competitiveness factors so that the region develops in a homogenous and sustainable way, both economically, socially and environmentally

Source: Comunidade Intermunicipal do Tâmega e Sousa

In order to reach the listed stakeholders, please communicate with representatives of the CIM do Tâmega e Sousa:

Mário Júlio – Mario.Julio@cimtamegaesousa.pt
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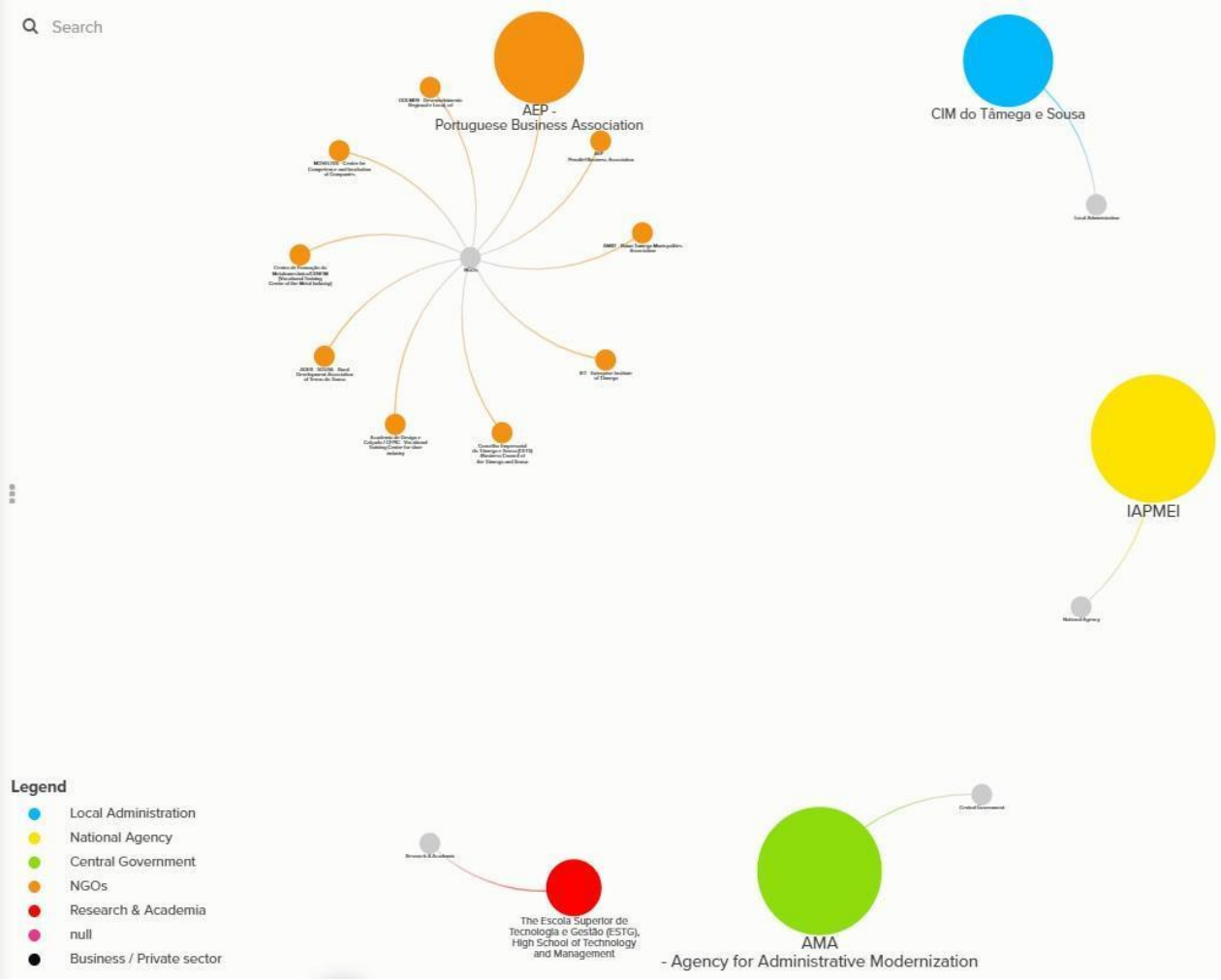
4560-547 Penafiel
Telephone (+351) 255 718 340

Fax: (+351) 255 718 349
E-mail: geral@cimtamegaesousa.pt

Figure 32. Map of Stakeholders' groups in Portugal



Source: Source: KUMU Map

4.2. Good practices of DigiBEST partners

This part unites all Good Practices in relation to digitalisation of economy proposed by the DigiBEST partners that reflect the context of a regional or national development, as well as tackle the public policies.

The exchange of Good Practices and experience (learning process) is seen as a crucial component of the DigiBEST project to achieve expected objectives and it will lead to the designing of new measures (Action Plan) to be implemented in partners' region during the 2nd project phase – to improve policy instruments and address the national or regional challenges related to digital transformation of SMEs.

The pool of DigiBEST Practices represents 20 different examples of such measures as collaboration models, strategies, digital innovation hubs, support offices or services, training programmes, funding programmes, advisory or mentoring programmes, tools for assessment of digital maturity and recommendations or plans with specific actions and others that proved efficient in the facilitation of business digitalisation.

The proposed Practices can serve as a solution to address challenges related to digital skills at managerial or employee level, lack of the specialists to lead digital transformation of the company, lack of the vision and strategy for business digitisation services, lack of the basic digital tools/knowledge in small companies, shortage of digital infrastructure in remote areas, collaboration or networking with other businesses, and others.

According to the DigiBEST methodology and in the result of cooperation between project partners and local stakeholders, all Good Practices are grouped into 3 different categories: 1) Awareness rising and collaboration; 2) Empowering tools; 3) Enabling environment.

According to the Interreg Europe Programme, "good practice" is defined as an initiative (e.g., methodologies, projects, processes, techniques) undertaken in one of the programme's thematic priorities which has already proved successful and which has the potential to be transferred to a different geographic area. Proved successful - means the good practice has already provided tangible and measurable results in achieving a specific objective.[140]

More detailed description of the Good Practices is available at the Attachment 3.

Table 14. Overview of the DigiBEST practices by category

No	Region, Country	Good practice	Short description
AWARENESS RISING AND COLLABORATION			
1	Latvia	Smart Latvia & Digital Maturity Test	Project that helps Latvian companies in digital transformation by providing an easy-to-understand and convenient assistance (maturity tests & recommendations).
2	Latvia	Programme "My Latvija.Lv! Do Digitally!"	The comprehensive communication and training programme to inform and encourage society to use online services offered by the government.
3	Trøndelag, Norway	Restructuring Motor – Digital Competence Enhancement	National digital competence programme (training) for SME's for increasing knowledge of success factors – digitalisation to be able to execute changes in the business.
4	Basilicata	Digital Innovation	DIHB is an informative and consulting office for the

[140] Interreg Europe, *Glossary*. Retrieved from: http://www.interregeurope.eu/help/glossary/

	Region, Italy	Hub Confindustria Basilicata	transfer of technological innovation and digital transformation, offering the complex of free of charge services.
5	Basilicata Region, Italy	Digital Business Points	Initiative of Italian Chambers of Commerce aimed at supporting the digitalization of SMEs (network of "physical" and "virtual" service structures).
6	Basilicata Region, Italy	Growing in Digital	The project is aimed, through the acquisition of digital skills, at promoting employability, of NEET (young people aged 15-29 who do not study and do not work) and invest in their skills to drive companies in the Internet world.
7	Austria	Digital Pro Bootcamps	The funding programme that aims to combat the IT skills shortage on the Austrian labour market (4-weeks bootcamp to transform employees into "digital professionals").
8	Tâmega e Sousa, Portugal	Business Space	Service designed to support entrepreneurs in the creation and management of their business, in a logic of single point of contact between the government and SME.
EMPOWERING TOOLS			
1	Latvia	Consultancy on Business Support	Free individual mentor consultancy for SMEs (including home producers) to establish their visual identity on the Internet & increase market competitiveness.
2	Tâmega e Sousa, Portugal	Citizen's Shop	A concept of public services that brings together several public and private entities in the same space.
3	Tâmega e Sousa, Portugal	Programme Portugal Industry 4.0	The Industry 4.0 initiative intends to generate favourable conditions for the development of national industry and services (SMEs) in the new paradigm of the Digital Economy, through a set of measures.
ENABLING ENVIRONMENT			
1	Latvia	Digital Innovation Hub	DIH offers a set of support measures for SMEs to acquire knowledge on the actual digital solutions & improve problem-solving capabilities.
2	Trøndelag, Norway	Development of Digital Networks (Fixed & Mobile) in Non-Commercially Viable Areas	Regional project on digital infrastructure development in non-commercial areas: an example of good cooperation between the municipality, County Council, Telecom and SMEs.
3	Trøndelag, Norway	Public-Private Cooperation & Funding Model for Business Gardens-Creating Ecosystems	Public-private cooperation and funding model within the Business Gardens & Incubators serves as a regional tool to provide SMEs with basic knowledge, e.g., about digitalisation as well as for building local ecosystems.
4	Granada Province, Spain	Programme "Ticcamaras"	Programme providing to local SMEs a series of instruments, activities and support to help their digitization processes and applications of IT (diagnosis by

			technological advisor and individual plan for implementation).
5	Granada Province, Spain	Digital Transformation Offices	Creation and consolidation of DTO to facilitate the digitization process of the Spanish SMEs (in the form of consultations) and promote digital entrepreneurship.
6	Granada Province, Spain	Guadalinfo	Guadalinfo – social network of inhabitants in Andalucía – offers a free accessible public space on the internet which aims to generate projects and initiatives and stimulate the transformation of local areas.
7	Granada Province, Spain	Programme "Digital Advisors"	Promotion of the digital transformation of SMEs through individualized advice by specialized agents (digital advisors).
8	Austria	Programme - Digital Innovation Hubs	DIHs support SMEs in surviving the digital change and realizing the innovation and growth potential that digitalization can bring to them.
9	Austria	"SME.DIGITAL"	Programme that offers advice on digitization and, since 2019, financial support for the implementation of specific digitization projects

Source: Regional Studies of DigiBEST partners

5. Main barriers and proposed solution analysis for promoting the digital transformation of SMEs

This part of the Joint Report reflects barriers for SMEs digitalization identified by the DigiBEST partners, as well as possible solutions to overcome these barriers. The purpose of this analysis is to present and compare DigiBEST partners' identified barriers for the SMEs digitalization, as well as all possible solutions that could be used to deal with these barriers. Proposed solutions could bring new ideas for partners to deal with identified solutions, as well provide an added value for Action Plans.

Full versions of the barriers & solutions analysis of the DigiBEST partners are provided in the Appendix 4.

The SMEs digital transformation barrier and solution analysis of the DigiBEST partners' is mainly based on literature and document review.

The barrier & solution analysis separates barriers and solutions into five categories:

1. Awareness rising & collaboration;
2. Enabling corporate environment & capacity building;
3. Administrative & technical & legal obstacles;
4. Financial & economic barriers;
5. Policy and security barriers.

Five parts of this chapter present barriers and solutions identified by the DigiBEST partners arranged according to the above mentioned categories. Each part of this chapter presents and compares all barriers selected by project partners. Many of identified barriers are similar for DigiBEST partners, while some of barriers are specific to particular partners (see Tables 15 to 19).

There are a variety of possible solutions offered by the DigiBEST partners for dealing with identified barriers. In some cases, also created instruments for dealing these problems have been mentioned. Many of proposed solutions could be useful for other partners and bring new ideas for dealing with existing barriers. Therefore, solutions are presented according to different problem areas identified

for each of the five categories according to the information provided by the DigiBEST partners in their Regional Studies (see Tables 15 to 19).

5.1 Awareness rising & collaboration

Awareness rising & collaboration are very important taking into account that digital innovation nowadays is advancing at an unprecedented speed. As a result, businesses must be able to react and adapt to this ever-changing landscape. For many businesses, the security of 'sticking to what they know' can seem favourable to trialling a new technology, but by the time they have come around to the idea of change, the likelihood is that that new innovation is already old news. For digital transformation to be a success, businesses have to be willing to try something new, and to try it quickly. Therefore, there should be communication channels developed to increase awareness of SMEs and disseminate information on digital innovation and its offered benefits for enterprises.

Another important obstacle is an inadequate collaboration between IT and businesses despite the fact that technology and IT are an intrinsic part of any organization. Therefore, new solutions should be searched in order to link IT with other businesses.

The most often named barriers for the DigiBEST partners is a **low digital maturity** of SMEs that presents the major problem for digitalization. Other more often identified problems are related to **lack of digital skills and employees with such skills, gaps in ICT education, lack of awareness and insufficient cooperation**. **Low performance on e-commerce** is another barrier or consequence of existing problems mentioned by the DigiBEST partners (see Table 15).

According to proposed solutions they can be grouped in four categories (see Table 15). These are solutions for promoting:

I. Digital education, skills and accessibility of skilled workforce;

II. Dissemination of information, communication and awareness rising;

III. Services and support programmes for SMEs digitalization;

IV. Policy level initiatives.

Trøndelag Region (Norway) particularly stresses that solutions for existing barriers have been identified by "The Industry 4.0" - Trøndelag project, which is already underway targeting SMEs for increasing their awareness and knowledge about digital tools and possibilities.

Norte Region (Portugal) has created the training offer in i4.0 for higher education (university students), as well as programs "Robots Demonstrators" executed by Institutes of Higher Education (Polytechnic) and Learning Factories Promotion initiative.

Basilicata Region (Italy) is working on removing existing barriers through territorial institutions of Digital Innovation Hubs (DIH) and Digital Business Points (PID) and through the National plan "IMPRESA 4.0". In addition, various focus groups and discussions have been started with associations and clusters for RIS3.

Andalucía Region (Spain) is working on their barriers of SMEs digitalization by implementing the Strategy for promoting the ICT sector in Andalucía 2020, as well as the 2020 Digital Business Plan (PAED 2020) of Andalucía and the Andalusian Economic Plan 2014-2020.

Austria has been working on implementing the program of the Federal Ministry for Digital and Economic Affairs – Digital Austria, and providing innovative support offers by (high tech) incubators, such as programs focusing on the cooperation of start-ups and bigger companies with incubators as "go between".

A full list of proposed solutions that could be used for dealing with existing barriers is listed in Table 15.

Table 15. Barriers and solutions in the area of Awareness rising and collaboration

Awareness rising & collaboration	
DigiBEST partner region / country	**Identified barriers**
Latvia	● Low adoption of technology, specifically micro & small enterprises; ● Low e-commerce performance / lack of enterprises selling online; ● Decentralised activities & communication.
Trøndelag Region, Norway	● Low digital maturity and adaptability to rapidly changing technology; ● Lack of cooperation between suppliers of skills and support structure towards digital transformation.
Basilicata Region, Italy	● Low digital maturity; ● Lack of collaboration of the regional innovation system.
Andalucía Region, Spain	● Digitalization is not considered as one of the main concerns for the Andalusian business; ● Lack of digitalization strategies at the management levels of businesses, lack of digital skills of employees and managers, low use of mobile devices with internet access at companies; ● SMEs are not aware about available digital technologies in the market; ● Employees resistance to work with new digital procedures; ● Lack of qualified staff to implement the digital transformations in the businesses.
Austria	● Lack of information and communication; ● Lack of cooperation between start-ups and big companies; ● Dealing with consequences of COVID-19 pandemic crisis and its consequences; ● Low rate of ICT students; ● Low adoption of technology, specifically micro & small enterprises; ● Low e-commerce performance / lack of enterprises selling online; ● Decentralised activities & communication.
Norte Region, Portugal	● Workforce with low level of digital skills; ● Limited cooperation among SMEs; ● Low Awareness/ knowledge.
Proposed solutions	
Categories	**Solutions**

I. Digital education, skills and accessibility of skilled workforce	1. Training programmes for NGOs, municipalities, front offices of state institutions, facilitating 'train the trainer' support to SMEs; 2. Creating specialised ICT-curricula and study programmes on all levels; 3. Creating the training offer in i4.0 in higher education (university education); 4. Expanding workshops, which teach small enterprises simple ways to engage in e-commerce (such as through the use of online platforms), to boost the adoption of technologies and help more efficient firms gain market share; 5. Establishing a pool of competent professionals – sharing service to ensure that several businesses can hire professionals together (labour pooling); 6. Promoting digital qualification; 7. Creating programs of "Robots Demonstrators" executed by Institutes of Higher Education (Polytechnic); 8. Promoting Learning Factories; 9. Adjusting people's knowledge, through human resource training programs, to allow companies to transition to industry 4.0 and ensuring that it is done in an inclusive manner and based on qualified employment.
II. Dissemination of information, communication and awareness rising	1. Disseminating information on digital innovation and its offered benefits for enterprises (i.e. larger networking events, including collaboration between the key actors); 2. Selection of success stories of enterprises that have successfully adopted technologies and demonstration of the value of digital transformation process, thus, encouraging others to business modernisation in order to maintain their market share; 3. Implementing actions to increase awareness about the benefits of digitalization, both in the internal procedures and in connection with markets; 4. Rising awareness of the importance of having employees with digital skills; 5. Using testimonials, SME and start-up networks, and blogs; 6. Developing coordinated communication channels to increase awareness of SMEs; 7. Facilitating communication channels between the ICTs and the SMEs.
III. Services and support programmes for SMEs digitalization	1. Creating a one-stop-shop for those who wish to know more about digital transformation (EDIH) as part of Digital Europe Programme; 2. Creating a common directory of ICT services available to all the SMEs; 3. Selection of a certain number of SMEs to act as 'digital champions' and assigning an individually tailored support programme for them; 4. Selection as the main target group sectors with a low usage of ICTs and funding their digitalisation by government grants and

	digital transformation initiatives coordinated by support of relevant mentors/digital agents; 5. Developing and implementing a single business services platform; 6. Ensuring proactive and adapted to life situations information, as well as integrating provision of business-related services; 7. Implementing coherent competence frameworks and support platforms (i.e. fit2internet) 8. Creating innovative support offers by (high tech) incubators, i.e. programmes focussing on the cooperation of start-ups and bigger companies with incubators; 9. Increasing participation in the broad range of programmes offered by government; 10. Providing support for start-ups of students and academics.
IV. Policy level initiatives	1. Coordinating large degree cooperation on digital transformation (i.e. the legitimate coordinator (without financial interests) should be county council together with regional business gardens/ incubators and R&D environment); 2. Implementing a policy of digital skills development between the employees and company managers; 3. Defining a clear role for clusters and digital innovation hubs or innovation clusters as a part of a national framework for digitalisation of SMEs; 4. Establishing permanent digital pilot projects.

Source: DigiBEST Regional Studies

5.2 Enabling corporate environment and capacity building

Undertaking digital transformation effort requires a risk-aversive culture and a business being willing to explore and experiment, organizations need to ensure they are facilitating these changes from the inside out. Therefore, a requirement of creating a culture where innovation is being encouraged is a precondition to transformation success.

The digital transformation implies a change across the entirety of a business. Unfortunately, most businesses still believe that planning to protect their core business, rather than expanding into innovation and embracing the changing digital world, is the key to success. Therefore, enterprises need to ensure they have necessary capabilities and right people in place to facilitate these changes, as well as capable managers to undertake digital transformation initiatives.

In addition, staff of enterprises needs to be willing and able to use new technologies and IT. Therefore, having necessary skills and their regular upgrade is another challenge that businesses may experience.

The most often named barriers for the DigiBEST partners in this category is a **lack of skills, knowledge and competence** of SMEs that presents the major problem for digitalization. Other the most often mentioned problems are related to **insufficient support resulting in a low innovation potential** (see Table 16).

According to proposed solutions they can be grouped in three categories (see Table 16). These are solutions for promoting:

I. Training, qualification and ICT competence

II. Business and legal incentives

III. Awareness rising and collaboration.

Among already existing solutions for listed barriers the Trøndelag Region (Norway) particularly stresses "The Industry 4.0" – Trøndelag project, which is already underway. For building the ecosystem the Trøndelag council is orchestrating regional ecosystems with R&D and other actors. In addition, the Action program for Strategy for innovation and value creation in Trøndelag 2020-2021 is being enforced.

The Norte Region (Portugal) government has defined several programs that help to deal with existing barriers, such as "Capacitar i4.0", "Assimilar i4.0" and "Coaching i4.0".

The Basilicata Region (Italy), which is struggling with having a fast internet access on its whole territory has signed the framework agreement on the development of an ultra-broadband network between government and region of 11 February 2016 and is essential for an enabling environment and capacity building.

The Andalucía Region (Spain) is working on their barriers of SMEs digitalization by implementing the 2020 Digital Business Plan (PAED 2020) of Andalucía.

A full list of proposed solutions that could be used for dealing with existing barriers is listed in Table 16.

Table 16. Barriers and solutions in the area of Enabling corporate environment and capacity building

Enabling corporate environment & capacity building	
DigiBEST partner region / country	**Identified barriers**
Latvia	● Lack of incentives for digitalization; ● Lack of skills required for business digital transformation implementation; ● Enterprises lag behind in providing in-work training.
Trøndelag Region, Norway	● Lack of appropriately tailored support structures, and lack of engagement with existing support structures; ● Limited capacity to employ ICT specialists or professionals to lead digital strategy or drive organisational change; ● Insufficient innovation potential of SMEs; ● Lack of rural ecosystems, where businesses can cooperate to overcome lack of skills and specialist personnel.
Basilicata Region, Italy	● Only partial internet access on the regional territory; ● Limited hard and soft skills; ● Insufficient innovation capacity is a result of several factors – urban rural divide, brain drain, lack of financing, lack of visions for business etc.
Andalucía Region, Spain	● Lack of culture to take the risks. Family microSMEs with no real intention of changing their procedures; ● Lack of capable managers and staff to undertake digital transformation initiatives; ● Lack of proper management of the business's social networks.

Austria	● Lack of innovation, risk adversity; ● Lack of necessary specialised ICT-skills; ● Lack of qualified ICT-trainers; ● Educational gap; ● Lack of acceptance of innovations by government as client for ICT; ● Lack of pedagogical concepts for IKT.
Norte Region, Portugal	● Reduced level of registration of industrial property; ● Low level of Digital GDP; ● Knowledge gaps; ● Low level of digital skills of Human Resources.
Proposed solutions	
Categories	**Solutions**
I. Training, qualification and ICT competence	1. Separating strategies for different skill levels and individual purposes; 2. Offering a broad mix of skills developing programmes to the workforce matching the changing demands of the labour market in line with accelerating technology development and its impact on both creating new jobs, but destroying others, i.e. new training policies aimed specifically at SMEs digitalization, not for the digitalization in general, which can help to adapt and find higher-quality solutions; 3. Improving educational system with skills which are important for further entrepreneurs or workforce (well-prepared after school graduation); 4. Introducing a legal framework for work-based learning, simplifying procedures to receive the incentive for providing work-based learning; 5. Strengthening links between vocational schools and enterprises employing ICT specialists and increasing the proportion of work-based learning; 6. Increasing digital, methodical, social, communication and personal skills; 7. Promoting lifelong ICT learning; 8. Putting a special focus on dual vocational training with ICT content; 9. Establishing a Competence Framework for Digital Skills, implementing competence tests; 10. Focusing programs with an emphasis on the basic skills for unskilled workers; 11. Hiring an employee or a company capable of updating the social network in a continuous way, through a stimulation of awareness of how the social networks facilitate the new costumers and markets access.

II. Business and legal incentives	1. Creating a disincentive for businesses interacting with government offline by prioritising businesses that access services digitally (for example by issuing permits or payments more quickly or with lower price services to enterprises that interact online); 2. Ensuring a proper registration of intellectual property rights associated with investment projects in technological innovation as a source of revenue can be an incentive for new important projects for the digitalization of SME´s; 3. Increasing business maturity through the exchange of experiences with other businesses that have completed its own digitization process; 4. Using digital technologies in form of mobile end-devices and direct clients as "gateway" for further applications; 5. Creating a culture for both, public and private sector, where innovation is being encouraged, e.g. promoting collaboration between various stakeholders (Triple Helix, Quadra Heliz, Penta Helix models), especially in EU funded projects; 6. Continuing to be proactive in innovation at the government level and evolve at a faster pace in preparing companies and organizations for digital transformation; 7. Creating a "gov-tech" platform to provide a government institution as the first reputation client for start-ups.
III. Awareness rising and collaboration	1. Increasing awareness of the benefits of digitization, both in internal procedures and to connect to markets. 2. Promoting workshops, meetings and reunions to increase awareness of the benefits of digitization, both in internal procedures and to connect to markets. 3. Establishing cooperation between the educational system and economy; 4. Increasing awareness of the benefits of digitalization, both in internal procedures and in connection to markets.

Source: DigiBEST Regional Studies

5.3 Administrative, technical and legal obstacles

This category of barriers is related to the decision-making process, i.e. administrative, technical and legal barriers. Digitalization initiatives could be particularly sensitive to administrative barriers placed by legislative framework, bureaucracy, tax policy, procurement, lack of experience or resources, etc. A failure to change legacy systems for new technology will continue to act as a significant blocker for SMEs digital transformation. If such barriers exist, it would be important to look for solutions how to remove them in order to promote SMEs digital transformation. At the same time, identified barriers & solutions should be specific for the SMEs digitalization, not for the digitalization in general.

The most of existing barriers for the DigiBEST partners in this category should be solved on a national or local government level, and only some on business levels. Such barriers as **shortages in legislation and policy making, bureaucracy, and infrastructure** are among the most often mentioned by the DigiBEST partners (see Table 17).

All of the proposed solutions should be solved on **national or local governmental levels**, as well as the EU level. The EU level proposal concerns implementing a common European regulatory framework to make easier the access to digitalization for SMEs.

According to proposed solutions they can be grouped in three categories (see Table 17). These are solutions for dealing with:

I. Administrative and legal issues
II. Infrastructure and technical issues
III. EU level issues.

Among already existing solutions for listed barriers Latvia has established several programmes to increase R&D as part of the National Development Plan for 2021-2027 in order to raise the innovation in the private sector. The Trøndelag Region (Norway) hasn't named any barrier in this category.

The Norte Region (Portugal) has a national level strategy and various public support programmes, whereas Andalusian Region implements the 2020 Digital Business Plan to overcome barriers in this area.

The main problem mentioned by the Basilicata Region (Italy) is slow and articulated bureaucracy. To overcome this problem there is the Digital transformation of the public administration programme (Teamdigitale.governo.it) in place.

A full list of proposed solutions that could be used for dealing with existing barriers is listed in Table 17.

Table 17. Barriers and solutions in the area of administrative, technical and legal obstacles

Administrative, Technical and Legal	
DigiBEST partner region / country	**Identified barriers**
Latvia	● Low innovation of businesses as a factor of slow productivity growth; ● Adoption of the ICT is held back by tax policies that favour small enterprises, ● On the business level the most of barriers are related to lack of capacity/time, lack of workers with adequate skills to take full advantage of ICTs, and those with complementary skills (such as management) required to transform work practices in business.
Basilicata Region, Italy	● Slow and articulated bureaucracy.
Andalucía Region, Spain	● Lack of compatibility between old and new system to be implemented in companies; ● Limited access to basic infrastructures, broadband network and use of ERP tools (enterprises resources planning); ● Lack of automation in basic processes such as issuing invoices or e-commerce.
Austria	● Perceived (or suspected) "bureaucracy"; ● Immigration laws as hindrance to employ ICT-experts (immigrants); ● Lack of evaluation of measures and programmes, so the impact is not convincingly visible to SMEs;

	● Lack of proven impact; ● Lack of ultra-high speed broadband; ● Unwillingness of company management to invest in digital projects.
Norte Region, Portugal	● Difficulties of coordination/prioritisation of public support programmes across the schemes and transparency of execution levels; ● National strategy in place, but not yet defining clear roles across stakeholders, including digital innovation hubs, clusters and associations; ● Fragmented and often inappropriate supply across technologies, offers and providers; ● Low speed justice system negatively impacts the digital competitiveness of Portuguese economy.
Proposed solution	
Categories	**Solutions**
I. Administrative and legal issues	1. Providing prise incentives to make cheaper the access to broadband and high-speed Internet; 2. Facilitating laws and access system to e-commerce; 3. Redesigning processes of relevant administrative and controlling procedures of businesses through stimulation of the awareness on how the improvement of such procedures saves time and money; 4. Making administrative processes of projects less bureaucratic; 5. Adapting the red-white-red card for highly qualified (immigration) workers.
II. Infrastructure and technical issues	1. Improving the wire digital network to encourage hiring. Make the contract cheaper with broadband and high-speed internet; 2. Setting up a centralised “yellow pages” repository for digital providers; 3. Promoting projects that demonstrate technology use cases, such as the use of 5G in production by providing targeted funding which is tied to specific result indicators; 4. Promoting nationwide expansion of the fibre optic network.
III. EU level issues	1. Implementing a common European regulatory framework to make access to digitalization for SMEs easier.

Source: DigiBEST Regional Studies

5.4 Financial and economic barriers

Financial and economic barriers are related to the access to finance. Financial and economic barriers are usually the most crucial ones for SMEs making decisions about introducing new technologies and IT. Digital transformation costs can be high and businesses should be willing to invest in the process. Sometimes enterprises simply lack funding, but on other occasions it may also be the unwillingness of senior management to invest budget into digital transformation projects. Therefore, solutions could be found in making internal decisions to adapt businesses to stay competitive, as well as to

provide external support measures to ensure increase in innovation and competitiveness of enterprises.

The **Access to financing and resources** is the main barrier for all of the DigiBEST partners in this category. Also, the **lack of information about funding possibilities** is among the most often mentioned barriers by the DigiBEST partners (see Table 18).

Most of the proposed solutions should be solved on **national or local governmental levels** and others **in cooperation with private partners**.

According to proposed solutions they can be grouped in three categories. These are:

I. Governmental level initiatives and solutions
II. Credit lines and private incentives
III. Awareness rising actions.

A full list of proposed solutions that could be used for dealing with existing barriers is listed in Table 18.

Table 18. Barriers and solutions in the area of Financial and economic obstacles

Financial and Economic	
DigiBEST partner region / country	**Identified barriers**
Latvia	● Low e-commerce performance / lack of enterprises selling online; ● SMEs have difficulties accessing finance to invest in ICT.
Trøndelag Region, Norway	● Limited access to capital and finance; ● Lack of access to information about support instruments and public funding possibilities.
Basilicata Region, Italy	● Difficulty in accessing (infrastructure) Italian and foreign markets.
Andalucía Region, Spain	● Digitization costs considered as an expensive investment; ● Lack of awareness about the importance of investing in digitization, due to the size and nature of the Andalusian businesses; ● Difficulty in accessing financing sources to undertake businesses digitization projects.
Austria	● Access to funding: Lack of funding for the implementation phase; ● Lack of usage of digitalization in SME; ● Low usage of Cloud and Big data; ● Lack of resources as main obstacle to digital innovations in enterprises.
Norte Region, Portugal	● SMEs that lack sufficient (physical) collateral, limited financing for more advanced, larger-scale, and riskier technological projects; ● Difficult access to financial resources for the digital transition.

Proposed solutions	
Categories	**Solutions**
Governmental level initiatives and solutions	1. Developing a nationally funded programme to promote the adoption of existing technologies among SMEs and offer a number of grants across different sectors, so that such firms can act as an impetus for competitors to adopt more efficient technologies and business practices; 2. Offering tax incentives could be introduced to encourage small firms to invest in ICT; 3. Reformulation of Industry 4.0 vouchers in areas of greater focus; 4. Opening of new Calls on Information Systems that positively differentiate in their merit, projects that include Industry 4.0 objectives, with i4.0 technology investments; 5. Identification, in partnership with European Investment Bank (EIB), of financing solutions to facilitate the implementation of digitization processes; 6. Disseminating and facilitating access to investment and financing instruments and mechanisms oriented to projects within the scope of i4.0; 7. Creating and adapting funds and support lines to the typology and diversity of projects within the scope of i4.0 digital transformation and the expansion of services and products to the international context; 8. Creating specialised state funds for implementation of digital solutions for SMEs and Start-ups; 9. Creating specialised programs offering financial support for the implementation phase (e.g., new version of KMU Digital - The Austrian digitization initiative).
Credit lines and private incentives	1. Working with administrations and financial entities to facilitate access to subsidies or credit; 2. Providing credit solutions tailored to companies' financing needs related to implementation of their i4.0 investment plans; 3. Promoting available credit lines with business entities, as well as the tax benefits available to encourage productive innovation, digitalization and internationalization; 4. Promoting the use of Venture Capital.
Awareness rising actions	1. Rising awareness of the relationship between cost and benefits; 2. Using testimonials from cases of best practice and networking activities.

Source: DigiBEST Regional Studies

5.5 Policy and security barriers

This category of barriers is related to legislation, policy documents and policy making on both, national and regional levels, which might place obstacles for the digital transformation of SMEs. The cybersecurity issue is particularly important for this category. Cybersecurity risks now go hand in hand with digital transformation; businesses need to be able to protect themselves as more and more information is moved to the cloud, and as organisations become increasingly reliant on

technology. Therefore, cybersecurity is presenting a very tangible threat to the success of digital transformation projects. If businesses are to survive in the digital age, they need to ensure that their security measures advance alongside their digital transformation initiatives. This category of barriers will require to revise relevant legislative acts and normative documents, as well as policy documents and programmes.

Such barriers as **shortages of policy and regulatory framework, brain drain, risks of the concentration of digital skills only in urban areas and large companies** are among the most often mentioned by the DigiBEST partners (see Table 19).

All of the proposed solutions should be solved on **national or local governmental levels**, as well as the **EU level**. The EU level proposal concerns conducting the joint European fight against cybercrime.

According to proposed solutions they can be grouped in four categories (see Table 19). These are related to solutions for dealing with:

I. Administrative and legal issues
II. Financial issues
III. Support for businesses
IV. EU level issues.

According to the Latvian partner cybersecurity risks go hand in hand with digital transformation. Therefore, in September 2019, the Latvian Cabinet of Ministers adopted the Cyber Strategy that sets out the national priorities for the digital security policy in Latvia and identifies upcoming challenges. The strategy's main objective is to strengthen and improve digital security capabilities by boosting resilience against attacks and enhancing public awareness of threats in cyberspace.

In addition, the Digital Transformation Guidelines 2021-2027 of Latvia incorporates multiple policy domains under consideration: digital government, investment, business dynamism and SMEs, education and skills, and digital security and privacy.

The Norte Region (Portugal) has created cybersecurity training programs for at least 4 levels: Administration, Management, Management and Operational.

A full list of proposed solutions that could be used for dealing with existing barriers is listed in Table 19.

Table 19. Barriers and solutions in the area of Policy and Security

Policy & Security	
DigiBEST partner region / country	**Identified barriers**
Latvia	● Lack of policies to increase the use of digital technologies among small enterprises and the strategy for digitising the private sector.
Trøndelag Region, Norway	● Tendency that digital competence and skills are concentrated in urban areas may be a reason for SMEs in rural areas experiencing a double digital divide; ● Brain drain – people moving from rural to urban areas; ● Lack of coordinated public support funding for development projects.

Basilicata Region, Italy	● Concentration of digital competence in urban areas; ● Brain drain – very little study subjects on digitalization in universities and low perspectives for professional development.
Andalucía Region, Spain	● Low level of implementation of digital security policies; ● There is still no policy to unify the European digital market; ● Complexity of current Spanish and European regulations on security and electronic marketing.
Austria	● Not enough cyber security measures in companies; ● Research gap, few R&D publications in the field of ICT; ● Concentration of R&D in larger enterprises; ● National regulatory framework needs to be better adapted to digital development.
Norte Region, Portugal	● Need to develop an infrastructure to support the challenges of cybersecurity, responding to the concerns and needs of SMEs to make them digitally resilient.
Proposed solutions	
Categories	**Solutions**
Administrative and legal	1. Collaborative approach needs to be established for updating the existing policy documents of the Ministry of Economics, Ministry of Education and Ministry of Welfare in relation to above mentioned DT Guidelines, addressing related subjects like life learning programmes and promotion of business digitalization by matching such activities to labour market requirements. 2. This category of barriers requires to revise relevant legislative acts and normative documents, as well as policy documents and programmes. 3. Revision of the Directive on security of network and information systems (approved in 2016) that also introduces new tools such as the Internet of Things, little developed 7 years ago and vital today to ensure the security of all connections 4. It is difficult to improve/change the national level policy for county level authorities 5. Creation of cybersecurity training programs for at least 4 levels: Administration, Management, Management and Operational.
Financial issues	1. Consolidate funding of eGovernment projects into a single ministry that sets priorities according to a national digital strategy. 2. Global level trend. Not possible to reverse. Need to find mechanisms to compensate. 3. Invest in telecommunications infrastructure.

Support for businesses	1. Offer consultancy advice (one stop shop point) to laggard enterprises in sectors with a number of digitally mature firms to help them catch up with leading enterprises. 2. Providing SMEs with a help, advice and support service for SMEs elements affected by cyber attacks 3. Promotion of a collaborative environment between companies providing the sharing experiences and best practices 4. The framework of awareness raising campaigns, training and support instruments needs to be improved, involving SMEs as the focus group for planned activities.
EU level initiatives	1. Joint European fight against cybercrime.

Source: Regional studies of DigiBEST partners, authors' internet search

The identification of possible solutions for existing problems is also possible by investigating good practices of PP regions and countries. In addition, finding solutions for existing problems and proposals for policy recommendation shouldn't be limited to the partnership only, but could go beyond the frontiers of the partnership.

6. Assessment of policies promoting digitalization of enterprises

6.1 Main features of the national, regional and local policies towards the digitalization of SMEs

6.1.1 Smart Specialization Strategies

All DigiBEST partners have Smart Specialization Strategies on national and/or regional levels (NUTS 2). In all cases, the ICT is one of the focus areas of Smart Specialization Strategies included as a separate priority (Andalucía, Spain) or as a cross-sectoral priority.

Although Norway, as non-EU country, does not have ERDF-related interest for adopting the concept of smart specialisation, its national and regional programmes apply components of smart specialisation[141], including Trøndelag county. Please see Table 20.

Table 20. DigiBEST partners Smart Specialization Strategies (RIS3)

Region/ country	ICT/RIS3	Website address
Latvia	The priority of ICT development and digitalization is included in the Innovation Strategy for Smart Specialization, RIS3, 2014-2020, as a cross-cutting issue (national level).	http://www.izm.gov.lv/en/Science/smart-specialisation-strategy http://www.onlines3.eu/wp-content/uploads/RIS3_strategy_repository/LV_20130327_The_initial_position_of_Latvia_on_Innovation_and_SSS.pdf http://www.onlines3.eu/wp-content/uploads/RIS3_strategy_repository/LV_The_Informative_Report_Development_of_RIS3.pdf
Trøndelag, Norway	"Value Creation in Trøndelag" – strategy for innovation and wealth creation (containing components of smart specialisation).	https://www.trondelagfylke.no/contentassets/b91afe6250b342e9b2d73dc270993796/strategy-for-innovation-and-value-creation-in-trondelag.pdf
Basilicata, Italy	Regional strategy for the innovation and smart specialization 2014-2020-S3 Basilicata (regional level – NUTS 2). ICT as a cross cutting issue related to new technologies and innovation.	https://s3platform.jrc.ec.europa.eu/regions/itf5?s3pv=1&rel=2
Andalucía, Spain	Andalusian Innovation Strategy 2014-2020 (regional level – NUTS 2). The ICT and digital economy is defined as a separate priority, as well as a cross-cutting issue.	https://ec.europa.eu/growth/tools-databases/regional-innovation-monitor/policy-document/andalusian-innovation-strategy-2014-2020-ris3 http://ris3andalucia.es/ https://www.juntadeandalucia.es/export/drupa

[141] Nordregio (2018), *The potential o Smart Specialisaton for enhancing innovation and resilience Nordic regions*. Retrieved from: https://www.nordregio.org/wp-content/uploads/2018/02/The-potential-of-Smart-Specialisation-for-enhancing-innovation-and-resilience-in-Nordic-regions-1.pdf

		ljda/Documento-Ris3-version-final-8-27-02-15.pdf
Austria	Policy Framework for smart specialization in Austria (national and regional level strategies) ICT – among research, technology and innovation priorities as a cross-cutting issue.	https://s3platform.jrc.ec.europa.eu/regions/at https://s3platform.jrc.ec.europa.eu/documents/20182/223684/AT_RIS3_201611_Final.pdf/bbd4d208-e5bf-44c0-972b-b900857d78b3
Norte, Portugal	Norte 2020 – Regional Smart Specialization Strategy (regional level – NUTS 2). ICT – a cross cutting issue related to technology.	https://ec.europa.eu/growth/tools-databases/regional-innovation-monitor/policy-document/norte-2020-regional-smart-specialisation-strategy https://www.norte2020.pt/sites/default/files/public/uploads/documentos/norte2020_ris3.pdf

Source: DigiBEST Application form and Regional studies

During the last EU funds programming period (2014-2020) the Smart Specialisation approach has fostered the design and the implementation of place-based, innovation-driven economic transformation agendas in the regions and Member States of the European Union, which overall have developed more than 180 Smart Specialisation Strategies, with more than 67 billion euros available under the European Structural and Investment Funds (ESIF). These strategies involve national and/or regional public authorities, together with private businesses, higher education institutions and the civil society in collaborative and mutually reinforcing processes. Over the European programming period (2021-2027), Smart Specialisation is expected to continue to play a major role towards cohesion policy and regional development, and towards economic transformation in the long run.[142]

This has been considered that the ESIF and Cohesion Policy may be a key element in the EU response to Covid-19 since they are endowed with market-driven mechanisms that can help policymakers match the effective needs of their economies. Therefore, Smart Specialization Strategies (S3), in particular, can help rebuild regional economies around innovation, specifically by addressing and prioritizing the markets' demand side. In the new Commission's priorities of Energy & Environment and Digital & ICT are inherently linked to R&D and R&I – the core of S3 - thus strategic thinking on how to intertwine the two sectors will be required. In particular, in the policy area of Digital and ICT, a sound regulatory framework for the use of new technologies – AI, blockchain, supercomputing - may enhance efficiency in the governance of S3.[143]

6.1.2 National and regional policy frameworks

Policy planning documents of all DigiBEST partners related to digitalization are in line with the EU Digital Agenda and relevant EU directives. All DigiBEST partner countries and regions have a variety of national and/or regional level documents related to the digitalisation of SMEs and microenterprises. However, many documents are available in local languages only. A full list of

[142] European Commission, *Smart specialization platform*. Retrieved from: https://s3platform.jrc.ec.europa.eu/s3-implementation

[143] Federico Dante De Falco (2020,) *How Smart Specialization Strategies can impact the EU economy after the COVID-19,* August 2020, International Development Research Network, p. 1; Retrieved from: https://static1.squarespace.com/static/5e8ce9ff629cbb272fd0406f/t/5f2b1d7f204fb47312165a0c/1596661122119/How+Smart+Specialisation+Strategies+can+impact+the+EU+economy+after+Covid-19.pdf, viewed at 3.01.2021

DigiBEST partners' documents included in Regional Studies and their short descriptions can be found in the Attachment 4.

The DigiBEST partners that have a national level strategy for digitalization is Austria (*Digital Strategy for Austria / Digital Austria Initiative*), Spain *(Digital Spain 2025),* Italy *(Italy 2025).* Several other DigiBEST partners have regional level strategic documents for promoting business digitalization: 1) Trøndelag County Council on 2019 has adopted a special *Action program for Strategy for innovation and value creation in Trøndelag 2020-2021;* 2) Special strategies for promoting the digitalization of business of the Andalusia Region are *Andalusian Industrial Strategy (AIS)* and *Promotion Strategy of the ICT sector (TIC) Andalusia 2020.*

In the case of **Latvia** there isn't a single strategy yet for business digitalization. *S*everal ministries are sharing the responsibility for business digitalization. The Ministry of Environmental Protection and Regional Development of the Republic of Latvia is responsible for overall digital transformation strategy in the context of information and communication technologies, in the field of business policy the leading public administration is the Ministry of Economics, the Ministry of Education and Science is responsible for implementing policy in education and science, policy plan for the electronic communications sector is coordinated by the Ministry of Transport but Cyber Security Strategy is under responsibility of the Ministry of Defence.

The main framework document for promoting the digitalization in Latvia is the *Information Society Development Guidelines for 2014 - 2020*. The objective of these Guidelines is to ensure the continuation of the action policy in the area of information society development and determine the priorities of the ICT field for the EU Structural Funds planning period (2014-2020). For the next EU funds programming period the digitalization in Latvia is addressed in a new policy instrument *Digital Transformation Guidelines for 2021-2027*[144] – aiming at the continuation of public administration and services development, enhancing the business digitalisation, and the provision of digital skills.

For the **Trøndelag Region** of Norway the Trøndelag County Council is in charge of business delegation and creation of a favourable ecosystem for business competitiveness and development by developing regional plans, strategies and action plans based on input from both regional stakeholders and national strategies. Regional level strategies for Digital Transformation and the County Councils Action Program for Trøndelag form the basis for the digitalization of businesses.

The framework policy document for promoting the digitalization of Norway is the *Digital agenda for Norway – ICT for a simpler everyday life and increased productivity*. The purpose of this document that is also called a white paper is to present the Government's policy on how Norway can exploit ICT in the best interests of society.

At the regional level, the Trøndelag County Council has adopted the *Action program for Strategy for innovation and value creation in Trøndelag 2020-2021.* This Action program has been designed in cooperation with businesses to promote the use of smart technologies, competence of local users, as well as to define the region as a test area.

For **Italy**, the new Ministry of Technological Innovation and Digital Transition (MITD) is the main engine behind promoting the innovation and digital transformation of the country. The **Italia 2025** (Italy 2025) - prepared by the MITD is rooted in the aims of the United Nations' sustainable development, whose analysis indicates the three main challenges:

- the digitalization of the civil society,
- the innovation of the Country,
- the sustainable and ethical development of the whole society.

[144] DTG 2021-20271 is a part of the medium-term policy instrument – National Development Plan for 2021-2027, which is elaborated under the main national long-term development planning document Latvia's Sustainable Development Strategy to 2030 (Latvia2030)

In the **Basilicata Region**, the Department of Development, Labour, Training, and Research responsible for:

- Programming of regional politics for the promotion and development of production.
- Access to credit.
- Development and promotion of innovation, industrial research and technological transfer for companies, in agreement with the department "Coordination of European development policies, Schooling, professional training, university, research and labour" for activities that involve the university.
- Integration policies and coordination of industrial research networks.
- Development of employment and qualification for self-employment and professions.
- Development of craftsmanship, of cooperation, of industry and of services.
- Cooperation with the Chamber of Commerce.
- Coordination and management of the programme ROP ERDF.

Another involved regional entities is the Development Basilicata (Sviluppo Basilicata) and T3 Innovation responsible for "the assignment of strategic and management consulting service in the field of technology transfer aimed at enhancing the innovation potential of the Lucanian production system"; offering support in defining experimental development projects and in technological enhancement, also through the verification of solutions for the protection of intellectual property, the creation of synergy with scientific partners able to provide avant-garde solutions and with international players in order to favour international paths.

The main framework document for promoting the digitalization of **Spain** is the *Digital Spain 2025*[145] covering number of plans to foster digital public administration, SMEs digitalisation, competences and connectivity, as well as national *strategy Connected Industry 4.0 (CI4.0)*[146] to develop the industrial sector of Spain and foster its digital transformation.

On the NUTS 2 level for the **Andalucía Region,** the main strategies for digitalization are the *Andalusia Industrial Strategy (AIS)* and *Promotion Strategy of the ICT sector Andalucía (TIC 2020).* These strategies have resulted in the Incentive program for the digital transformation of SMEs (€ 37 million): analysis and diagnosis and transformation services hiring in the following areas: electronic commerce, electronic marketing, digitalization of business processes, digital trustworthy. Grants of 50% / Max € 75 000. Experimental development and Process innovation and Organization projects. In addition, there is a special plan for businesses - *Digital Business Plan* (PAED) with specific objectives: 1) to assess the degree of digitization of Andalusian businesses and the policies and trends that influence their digital transformation. 2) to identify the challenges facing Andalucía, prompting the objectives to be achieved in 2020. Define a PAED evaluation and monitoring plan. 3) Define and plan the necessary actions to achieve the specific objectives.

For the **Granada Province** of Spain, the main document for promoting business digitalization is the *Plan for the Development of the Local Productive Activity* (PDLPA), which is a part of the programme "Assistance and Cooperation for Local Economic Promotion" developed in a process of collaboration with stakeholders. This Plan is in full accordance with other policy documents and is an important instrument of the Provincial Council of Granada to improve the demand for technical and technological assistance for the creation and consolidation of SMEs. Work packages of the Plan include:

a) Support the SMEs innovation and competitiveness (including digital transformation).
b) Design, construction and management of local SME incubators.
c) Support for the association representatives of local strategic sectors.

[145] The Ministry of Economic Affairs and Digital Transformation, *2025 Digital Spain*. Retrieved from: https://portal.mineco.gob.es/en-us/ministerio/estrategias/Pages/00_Espana_Digital_2025.aspx

[146] Government of Spain. Ministry of Industry, Commerce and Tourism, *Industry 4.0*. Retrieved from: https://www.industriaconectada40.gob.es/programas-apoyo/Paginas/programas.aspx

For the Province of Granada, the ICT has been a useful and efficient tool for economic growth, creating employment and improving the quality of life for society. However, in order to continue maximizing the advantages offered by ICT and to promote the Knowledge Society, the PDLPA must renew and adapt its strategy to new upcoming challenges. Some of these immediate challenges include, foremost, the contribution of ICT to economic recovery and job creation. In this sense, ICT, as a transversal strategic element, must impregnate each productive sector of the provincial economy.

The promotion of digital transformation in **Austria** is a core task of the Federal Ministry for Digital and Economic Affairs (BMWD).[147] The main policy document for fostering business digitalization – *Digital Strategy for Austria / Digital Austria Initiative*[148] focusses on

- the creation of digitalization-friendly legal framework conditions to promote digital innovation
- the support of the economy (e.g., provision of financial support, development and dissemination of best practices in digital transformation, coaching)
- on expanded digital services for all citizens, (e.g. via the online platform „oesterreich.vg.at“ and, from 2019, the (free) digital office app („Digitales Amt“)).
- the coordination of the digitalisation activities of the entire federal government by a task force for digitalization

The digitalization activities of the federal government are coordinated by a task force for digitalization. Chief Digital Officers (CDOs) are appointed in each department. The CDO of the BMDW itself is also the head of Section I (Digitalization and e-Government).

There is also ongoing development of the strategy *Digital Austria in 2050*, under the BMWD, to harmonise existing and replace partly outdated strategies. Aim of the strategy is to foster digital transformation in selected priority topics (data, climate and environment protection etc.) and the further improvement of modern e-government services for the business sector as well as for citizens.

In the case of **Portugal**, the Ministry of Economy and Digitalization of Portugal, intending to generate the conditions for the development of national industry and services in the digital age, launched an initiative (*Portugal i4.0*) to identify needs of the Portuguese industrial space and a guide for measures (public and private) to achieve three central objectives:

- Accelerate the adoption of technologies and concepts of Industry 4.0 in the Portuguese enterprise sector;
- Promote Portuguese technological companies at an international level;
- Make Portugal an attractive hub for investment in the Industry 4.0 context.

Recently (2020), the **Action Plan for the Digital Transition** was prepared by the Ministry of Economy and Digital Transition to facilitate further digital opportunities for citizens, digital transformation for companies and digitization of the State. Among specific measures for SMEs – Digital Indoor SME Capacity Building Programme +CO3SO Digital, and Digital Innovation Hubs for Entrepreneurship.

The **Norte Region** of Portugal stands out, without national and European context, for the low levels of use of electronic commerce. It is the Portuguese region where the population buys less online, and one of the regions in which this indicator has the lowest values (21% in 2013, compared to 47% registered in the EU27). Generally, access to ICT in companies is in line with the EU average. Except for the use of some services by companies, such as the provision of a website, which is below the

[147] Federal Ministry Republic of Austria, *Digital Austria*. Retrieved from: https://www.bmdw.gv.at/en/Topics/Digitalisation/Strategy/Digital-Austria.html
[148] Ibid

European average. The use of ICT by workers also stands out as negative in the European context[149]. There is a dual situation, in which an increasing number of companies with a strong index of technological sophistication and use of advanced services coexist with a high number of companies with very low levels of technological incorporation, particularly in the SME segment.

6.2 Support policies and instruments to promote the SMEs digitalization

6.2.1 Policy instruments targeted by the DigiBEST partners

In all DigiBEST partner countries/regions, which are EU Member States, the ICT and digitalization are priorities of the Operational Programmes (OP) 2014-2020, which tackle the ICT development for promoting the ICT uptake, information society and ICT infrastructure development under its second Thematic Objective with the support of EU Cohesion Funds (ERDF). At the same time the competitiveness of enterprises is tackled under the OP third Thematic Objective. Therefore, in the DigiBEST project framework the OP is the policy instruments tackled by the three PP - Latvia, Basilicata Region and Austria. In the case of the Trøndelag Region, the policy instrument tackled in the framework of the DigiBEST project is the regional strategy ""Smart Societies" in "A value creating Trøndelag. Strategy for innovation and wealth creation in Trøndelag". The Granada Province of Andalucía, Spain, tackles a local level planning document "Plan for the Development of Local Productive Activities". And Tâmega e Sousa of the Norte Region, Portugal, works with a local level document "SI2E - System of incentives for work and entrepreneurship. Please see Table 21.

Table 21. Policy instruments and performance indicators addressed by the DigiBEST project partners

Political documents	Self-defined performance indicators	Targets
Latvia ERDF Programme "Growth and Employment" – Operational Programme for the use of ERDF funds, Priority axes 3, Priority" To improve competitiveness of SMEs"	Number of new development programs for SMEs digital transformation. https://ec.europa.eu/regional_policy/EN/atlas/programmes/2014-2020/latvia/2014lv16maop001 (EN)	1
Trøndelag, Norway "Smart society" in "A value that Trøndelag. Creates. Strategy for the creation of wealth in Trøndelag "	Number of firms with developed digital strategy. https://de.ramboll.com/-/media/61247eef6e694d33886e9f54b20af51a.pdf (EN)	50
Basilicata, Italy Operative Programme ERDF Basilicata 2014-2020	Number of programmes for the growth and employment and/or territorial cooperation programmes interested in the improvement of the project. https://ec.europa.eu/growth/tools-databases/regional-innovation-monitor/policy-document/erdf-regional-operational-programme-2014-2020-basilicata (EN)	1
Andalucía, Spain Plan for the Development of Local Productive Activities	Number of SMEs supported in their digital transformation. https://www.interregeurope.eu/oss/news/news-article/8719/granada-empresas-supports-entrepreneurs/ (EN)	50

[149] Comissão de cooordenação e desenvolvimento regional do Norte, *RIS3 Norte 2020.* Retrieved from: https://norte2020.pt/sites/default/files/public/uploads/documentos/norte2020_ris3.pdf

Austria Programme ERDF investments in the growth and employment Austria 2014-2020 - Operative programme for the use of ERDF funds, priority axis 2, measure 3D priority 9	Number of SMEs supported by awareness raising actions and business support activities. https://ec.europa.eu/regional_policy/en/atlas/programmes/2014-2020/europe/2014at16rfop001 (EN)	50
Norte, Portugal SI2E - System of incentives for work and entrepreneurship.	Number of SMEs that request the support of SI2E for digital transformation. These SMEs aim to improve their businesses through advanced technology and digital solutions. https://www.norte2020.pt/si2e (PT)	20

Source: DigiBEST project Application form

The policy instrument of **Latvia** - ERDF OP "Growth and Employment 2014-2020" – tackles the axes 3, priority "To improve competitiveness of SMEs". It aims at promoting a business enhancing environment that is based on available information (data), integrated ICT solutions for both the public and private sector and full inclusion of Latvia in the single European digital market. With regard to DigiBEST project goal and objectives as well as national priority axis of SMEs competitiveness, the policy includes such specific aid targets as promoting entrepreneurship, particularly by facilitating the use of new ideas in the economy and by supporting the creation of new businesses, including through business incubators; supporting the capacity of SMEs to achieve growth in regional, national and international markets and to engage in innovation processes; supporting the creation and expansion of improved capacity for product and service development; investment in institutional capacity and efficient public administration and public services at national, regional and local level to achieve reforms, better regulation and good governance. The policy is therefore aligned to Latvia's goal to improve the quality of life by contributing to national competitiveness, increasing economic growth and accelerating job creation. The implementation of the policy instrument, thus, needs to be optimised to make sure that rural areas' SME take full use of the available opportunities and that financed interventions lead to durable impacts to the benefit of Latvia's overall economic competitiveness.

The policy instrument proposed by the **Trøndelag Region, Norway**, addresses the "Smart Societies" of "A value creating Trøndelag. Strategy for innovation and wealth creation in Trøndelag". The Strategy was adopted in 2017. The policy document provides the strategy for increased sustainable value creation and international competitiveness of Trøndelag County. It emphasises the priority of building a resource efficient society with increased exploitation of smart technology. The Strategy focuses on achieving high competence in both, the businesses and public sector, in order to increase the use of new, smart technology. For the regional companies this means to focus more on digitalization and automation for achieving more efficient production. It also means developing new business models and products. Thus, this is imperative for SMS to start using digital technology for innovation and product development. It can be achieved through increasing their digital competence and creating an attractive co-operation environment for businesses and advisors/support system. The DigiBEST project will help Trøndelag to improve the policy for digital transformation of SMEs. The project will closely cooperate with stakeholders, including business gardens and incubators of the region. The policy should be further refined and developed taking into account the recent merger between the County Council of South and North Trøndelag into Trøndelag in the beginning of 2018.

The **Basilicata Region of Italy** works on its chosen policy instrument - OP ERDF Basilicata 2014-2020 - that targets the competitiveness of SMEs. Its' TO - 3A investment priority, being prearranged to promote entrepreneurship of an innovative nature, was chosen as it allows to pursue a fundamental purpose for the economy: strengthen the regional productive fabric by supporting the supply chains linked to the potential for development in the areas of greater production specialization (ICT, green economy and eco-innovation, automotive and precision mechanics). More in detail, the action 3A

3.5.1 foresees the introduction of new organizational or commercial production solutions, also using ICT applications and tools, in order to boost the competitiveness of SMEs. Also, the TO 2A priority- Improving access to ICT through the dissemination of the broadband connection, high-speed networks and supporting the adoption of emerging networks and technologies in the digital economy- in line with the provisions of the European Digital Agenda, aims to promote innovation, economic growth and progress through the creation of an advanced, widespread and pervasive digital infrastructure for the productive areas of Basilicata. This is expected that an improvement of the policy instrument will be ensured through an articulated system of interventions: granting of direct incentives, services, microfinance.

The province of Granada, Andalucía, Spain, has been developing the Plan for the Development of the Local Productive Activity (PDLPA) for more than ten years in a process of cooperation and collaboration with stakeholders. The PDLPA is fully consolidated with other policy documents and is an important instrument of the County Council of Granada to improve the demand for technical and technological assistance for the creation and consolidation of SMEs. Work packages of the PDLPA include:

a) Support the SME's innovation and competitiveness (including digital transformation).
b) Design, construction and management of local SME incubators.
c) Support for the association representatives of local strategic sectors.

In Granada, the ICT has proven to be a useful and efficient tool for economic growth, creating employment and improving the quality of life for society. However, in order to continue maximizing advantages offered by the ICT and to promote the Knowledge Society, the PDLPA must renew and adapt its strategy to new upcoming challenges. Some of these immediate challenges include, foremost, the contribution of ICT to economic recovery and job creation. In this sense, ICT, as a transversal strategic element, must impregnate each productive sector of the provincial economy.

The main goal of the policy instrument of **Austria -** Programme ERDF investments in the growth and employment Austria 2014-2020, is to provoke a structural change in SMEs through high-quality, innovative and target group-oriented offers. This will have positive effects on the productivity and profitability of organizations and will furthermore secure employment. The measure addressed (No.9): Support for growth in companies, where the focus is put on operational investments in connection with growth phases of SMEs.

The objective is to support companies in growing and adopting new technologies through: 1) Acquisition of new technologies for production and services; 2) expansive projects in the field of production and production-related services; 3) investments for new businesses or structure-improving business relocations; 4) investments for the production of new products and services. There shall be some significant improvements in the quality of operational services, embedded in innovative approaches.

Austria has developed a digital roadmap, which presents around 150 specific measures in twelve fields of action in order to ensure that Austria can optimally exploit the potential of digitalization. One of the 12 guiding principles is for Austria to become one of the world's leading digital business locations. To this end, it is important to provide support to businesses for their digital transformation.

Tâmega e Sousa, Norte, Portugal works on the SI2E - System of incentives for work and entrepreneurship. The main objective of SI2E is to promote entrepreneurship and job creation. In the Northern Region of Portugal, it is implemented with funds from NORTE 2020, through the ERDF and the ESF, and managed by Local Action Groups, Inter-municipal Communities and the Metropolitan Area of Porto. Based on the logic of stimulating small businesses in low-density areas or territories with high unemployment, SI2E allows application to European Union funds for the creation of micro and small enterprises or the expansion / modernization of micro and small enterprises. The main

beneficiaries are micro and small enterprises, including entities engaged in a craft or other activity on an individual or family basis, societies of persons or associations that regularly carry out economic activity. Applications, to be eligible, must demonstrate their contribution to the pursuit of the specific investment priorities. This policy instrument must be improved because a number of small/micro business organizations applications requesting digital transformation are comparatively small, almost insignificant, which means that these companies have specific requirements and should be targeted by using a different approach. Moreover, the boost of SMEs competitiveness through the digital transformation should be improved by proposing the right criteria for the policy instrument and creating more suitable application conditions for SMEs.

The next EU Structural funds' Programming period 2021-2027 will focus on the following five priorities[150], where digitalization will play a major role:

- **Smarter Europe,** through innovation, digitisation, economic transformation and support to small and medium-sized businesses
- a **Greener, carbon free Europe**, implementing the Paris Agreement and investing in energy transition, renewables and the fight against climate change
- a more **Connected Europe**, with strategic transport and digital networks
- a more **Social Europe**, delivering on the European Pillar of Social Rights and supporting quality employment, education, skills, social inclusion and equal access to healthcare
- a **Europe closer to citizens**, by supporting locally led development strategies and sustainable urban development across the EU.

6.2.2 Support instruments and measures used for the digitalization of SMEs

Besides the above-mentioned policy instruments for supporting the digitalization of SMEs and microenterprises, there are also other programmes, initiatives and measures to facilitate the ICT uptake by businesses.

In the case of **Latvia,** the government supports the digital transformation of enterprises through a number of complementary programs and initiatives (also using the EU funding). Support instruments to promote SMEs digitalization are coordinated by the Ministry of Economics and its subordinated Latvian Investment and Development Agency, but also through NGO's, which play a great role in bringing European activities, such as projects, to the regional and local levels.

The financial tools for development in **Trøndelag, Norway**, are the Regional Development Funds about EUR 10 mill each year. From that, EUR 5 million are delegated to the regional department of Innovation Norway to support business development and innovation. They also have national funds for that purpose. Therefore, the County Council has roughly EUR 5 mill for supporting most kinds of businesses and organisations. These funds are spent according to the regional strategies and action plans (spending is also based on directions/conditions attached to the transfer of the funds from the Government). Then only businesses in rural parts of the region are eligible for receiving funds based on application for project financing.

In the case of the **Basilicata Region, Italy**, support for SMEs digitalization is mainly provided through the OP ERDF Basilicata 2014-2020, as well as by using integrated territorial investment (ITI). To ensure the efficiency of the investments and reach the expected results, community regulations have been established in the new programming for the essential prerequisites for the choice of legal and programming measures (cd "on a conditional basis") of national and regional competence such as, for Basilicata, the drafting and adoption of plans for research in transport and waste disposal.

[150] European Commission, *New Cohesion Policy*. Retrieved from: https://ec.europa.eu/regional_policy/en/2021_2027/

At the national level, the ministerial strategy (*Italy 2025* (Italia 2025)) describes a process of radical structural transformation in Italy, from digital infrastructure to public administration services, to collaboration between the public and the private sectors to generate innovation. Coordinated work to be carried out through the "directory team" established with other ministries and coordination tables with the territories (municipalities and regions), boards, central agencies, and private subjects.

The actions will be developed together with the territories (municipalities and regions) with direct support in the implementation of the digitization projects and in the creation of projects ad hoc in order to pull innovative services into line with the needs of the area. The implementation of the strategy is based on the use of various financing funds, in particular:

- Funds assigned for innovation in budgetary manoeuvre;
- Fund that are not yet reserved, destined for national and European programmes (e.g.: PON funds, Pon gov, cohesion funds);
- Funds that are already available or for new programming periods thanks to a renewed collaboration with the civil service department.

The current government has renewed the *National Industry 4.0 Plan* (with the possibility of modifying some measures) and renewed its support for *the Digital Growth Strategy* through an even more active political orientation. Also, there is a number of **national funding actions** to support **business development** and **initiatives for digital transformation of the SMEs production processes** offered by the MISE.

In **Granada Province, Spain** - "Granada es Provincia" is the tool by which the Provincial County Council of Granada implements municipal programmes and strategic actions defined in the framework of the provincial competences. For example, new programmes could be developed in cooperation with municipalities for the promotion of measures to assist SME through innovation, "smart" concepts and digital transformation.

The **Austrian** digitalization strategy focuses on the support of the economy with digital public services, the creation of a digitalization-friendly environment to promote digital innovation as well as on expanded digital services for all citizens via the online platform www.oesterreich.vg.at and, since 2019, the (free) digital office app („Digitales Amt"). Once having signed in at www.österreich.gv.at, administrative services like the business service portal (USP – Unternehmensserviceportal)[151] or the portal of the revenue office (Finanzonline)[152] as well as the service platform "help.gv.at"[153] can be accessed via single sign-on. For entrepreneurs and start-ups, it is important that all necessary official channels are available electronically. These services are continually expanded.

Another important initiative of the Austrian government is the *KMU Digital - the Austrian Digitalization Initiative for SMEs* – it provides a comprehensive support for SMEs digitalization. The program includes consulting services and financial support for investments in new technologies and digitalization.

As a special service for start-ups, the registration of a new business, the tax office registration, insurance registration at the social insurance agency (SVA – Sozialversicherungsanstalt) and the declaration according to the New Business Support Foundation Act (NeuFÖG – Neugründungsförderungsgesetz) can be initiated via the Business Service Portal (www.usp.gv.at) and electronically signed by a mobile phone signature. From 2018 also the entry of a single person limited liability companies in the commercial register (Firmenregister) can be initiated via the Business Service Portal, which ensures a speedy registration for the most of newly founded enterprises. Also, the electronic payment for administrative procedures is possible. All contractual partners of the

[151] Company Service Portal. Retrieved from: www.usp.gv.at

[152] FinanzOnline. Retrieved from: https://finanzonline.bmf.gv.at/fon/

[153] Austria's digital office. Retrieved from: www.help.gv.at

federal government are obliged to transfer invoices solely in electronically structured form via the Business Service Portal. Citizens as well as businesses can retrieve documents online in their electronic post box.

Furthermore, full text research across the Business Service Portal, the Legal Information System (RIS – Rechtsinformationssystem des Bundes) and the open government data platform (data.gv.at) enable the swift retrieval of information about official matters on desktops and mobile devices. Thus, the number of government contacts can be substantially reduced for start-ups as well as for established enterprises.

The introduction of the mobile phone signature („Handy-Signatur“) opens the opportunity to sign legally binding documents, invoices and contracts electronically. With the introduction of the „digitales amt app” (digital office app) in 2019, it is now possible to use the mobile phone signature via this app. Also, card-based citizen cards, i.e. the Austrian social security card („e-card“) have been introduced nationwide.

Thus, citizens and businesses can be clearly identified when using digital official channels. Other important electronic services are the proof of residency (residence registration form) and the Electronic Health Record (ELGA Elektronische Gesundheitsakte)[154] which provides access to important health data for patients as well as health service providers. Also, the submission of tax forms and tax reviews can be more time effective and faster via „FinanzOnline“.

The Ministry of Economy and Digitalization of **Portugal**, intending to generate the conditions for the development of national industry and services in the digital age, decided to launch an initiative (Portugal i4.0). As a partner of SMEs in development and innovation, it has once again placed itself next to companies in this new challenge, generating conditions for the development of national industry and services in the new paradigm of the Digital Economy, supporting them in this adaptation, namely through making available a set of incentive systems that aim to modernize and innovate its products, services and business models, making them more competitive in the context of Industry 4.0. The available incentive systems are divided into three types of action:

- Digital Economy: For digital infrastructure projects, cloud computing and cyber security; Advanced analytics and AI; User-Centered Design; WCM and CRM - Web Content & Customer Relationship Management; E-Commerce and E-Marketplaces; SEO and SEA - Search Engine Optimization / Advertising Social media, content & mobile Marketing; Web Analytics.
- Productive Innovation: For projects of Productive Innovation in Connectivity; Intelligent production processes; Additive production; intelligent machines; Advanced materials; Modular operations; 3D printing; Autonomous robots.
- R & D - Research and Development: For R&D projects in cyber-physical systems; Virtualization and Simulation; Artificial intelligence; Scanning; Augmented Reality and wearables; Nanotechnology and advanced materials; Energy.

Please, see a full list of support programmes, initiatives and measures provided by the DigiBEST partners in the Attachment 5.

7. Regional Business Digital Transformation Assessment results

The main objective of the DigiBEST Business Digital Transformation Assessment survey was to evaluate the digital transformation performance of SMEs, as well as to draw conclusions for facilitating their digitalisation, which has become especially critical during the Covid19 pandemic crisis.

[154] ELGA (electronic health records). Retrieved from: http://www.elga.gv.at/en/about-elga/

This survey was designed to answer four main questions:

1. How do small and medium businesses (SMEs) proceed towards digital transformation?
2. Why and which digitalization solutions are being mostly used by SMEs?
3. Why don't businesses use particularly IT solutions or technologies?
4. How can authorities help businesses to promote the digital transformation process?

The survey in DigiBEST partner regions/countries was conducted from March to December 2020 and also in the beginning of 2021 in the case of Austria. Therefore, it has been particularly influenced by the Covid19 pandemic crisis which should have promoted the use of digital tools and solutions as many businesses, state institutions, schools and universities were forced to work in the virtual environment. It has been planned that the results of the survey will be used for research purposes leading to conclusions and recommendations to be used for policy documents to promote the digital transformation, as well as for dissemination objectives of the DigiBEST project.

There were following limitations for selecting companies participating in this survey: 1) SMEs with at least 3 years work experience; 2) More than 1 employee per company; 3) At least EUR 10 000 annual turnover over the last budget year; 4) No IT, technology or communication companies should participate in the survey.

According to the decision of DigiBEST partners this expert survey was supposed to have at least 40 responses in each of the partners' region/country. Therefore, on average 240 people have taken part in this survey. Please, see a full list of survey questions in the Attachment 6.

The main findings of this survey on individual partner level are provided below.

Latvia

- Almost all enterprises, except one, consider digitalization beneficial for businesses. Main benefits perceived are new clients, increased turnover and profits, increased recognition for their businesses, as well as improved experience of their customers.
- The four most desired digital technologies enterprises are interested to introduce are: databases technologies, big data or analytics, security scripting and wireless technologies.
- In order to promote digitalisation and sustainability of Latvian SMEs and microenterprises, it is important to work with their managers to inform and convince them about advantages and benefits of digitalization.
- Focusing on strategic approaches for introducing digitalization and cyber-security strategies in enterprises could provide them with necessary background for future growth and sustainability as this has never been a more important time for SMEs to have these strategies in place.
- The Government of Latvia should help to promote the digital transformation of enterprises by creating and providing support programs for management and employees (focusing on strategic issues with relation to management of enterprises); training programs to develop digital skills, as well as individual consultations.
- Other possible ways of assistance could be creating a handbook with recommendations with practical examples, how the digitalization can improve businesses and/or brochures with information about different digital solutions.

Trøndelag, Norway

- Respondents are aware of the benefits of digital transformation, but they also struggle with handling this challenge.

- The access to digital infrastructure is sufficient, but higher speed on the internet could be required in the future.
- The overwhelming majority of respondents use some kind of IT on a daily basis. Most often this is software for invoicing, cloud services and CRM solutions.
- Only 3% use 3D printers, which is worth noting, given the fact that 1/5th of respondents work within the Industrial production.
- As for the next three years, there are widespread plans among respondents to utilize a broad range of new technologies.
- The use of online services is high, with the more or less "forced" use of internet banking and public portal *Altinn*.
- One third of respondents claim that they cannot use e-commerce due to restrictions from partners and customers, and safety reasons.
- Use of social media is also high and its mostly used to promote personnel and businesses mainly using LinkedIn and Facebook.
- Over a half of respondents have a digital strategy mostly implemented, or plan to have it, while 38% of respondents don't have any plans for it.
- Nearly all respondents need employees with ICT skills, but only 10% have ICT specialists employed. One third of respondents buy external services.
- A half of respondents have employees with basic-above basic digital skills. This shows that digital transformation will be very costly for many of them, as they have to rely on external ICT specialists and consultants. It's a problem related to the lack of digital strategies and recruitment of employees with digital skills.
- The most important thing to do is to educate managers and train employees through support programs, as well as by using individual consultations.

Basilicata, Italy

- The majority of respondents consider that digital transformation has brought them greater corporate exposure, increase in company's profit and acquisition of new clients.
- Respondents which have answered that they don't have benefits from digital transformation are from parts of Basilicata with a poor IT infrastructure.
- The majority of companies interviewed have an internet connection that is sufficient for their daily needs, but expect that there will be improvement in speed and connectivity. Digital technology, which is the most widely introduced in the region, is a communication technology.
- Only 66% of respondents have digital security solutions and measures for the prevention of online attacks.
- Integrated IT security strategies are adopted by only 3% of respondents resulting from low skills and knowledge about digital solutions due to a modest basic digital literacy.
- Digital technologies have shown only a small positive effect with relation to the generalized change of business models of companies and their operations.
- The majority of small and medium enterprises have a great difficulty to imagine a potential impact that the application of digital technology could bring to their business, consequently there is little inclination towards research, development and innovation.

- The managerial culture in Basilicata has never been really linked to digitalization. This also results from a large number of family businesses existing for generations. A large number of SMEs and microenterprises reduces the speed of digital transformation.
- Entrepreneurs are urgently required to reflect on the impact that digitalization would have on their business and investment plans in the medium and long term, as well as to collaborate with the institutions to reduce bureaucracy, Italy's atavistic problem, which recently has been addressed by the legislation on the national level.
- The strategic action would surely be the involvement and training orientation on the activation of business digitalization processes provided by the stakeholders led by the Basilicata Development organization.
- There is a need to create an internal regional network with regional and European elements, as well as qualified staff on operational and managerial levels to facilitate the continuous access to emerging technologies and innovation.

Granada, Spain

- Businesses continue to see benefits of digitization from acquisition of clients and increased visibility rather than as an opportunity for saving on procedures, business innovation, improved management and business internationalization.
- Businesses mainly choose to use the optical wire (47%), while 15.66% of businesses still use the mobile connection of the internet. 33% of respondents would expect improvements in connectivity.
- During the next three years business owners would prefer to choose the information technology solutions and services that favor customer management (16.03%) and SEO (16.79%), as well as introduction of a digital billing (19.08%). (Automated billing processing represents only 13.86%).
- Most of respondents (96.30%) use online banking regularly.
- Regarding the use of available free public service portals or public tools, still 20.37% of respondents are unaware of them or think that they don't have enough knowledge to use them.
- Most of respondents (73.58%) regularly use e-commerce solutions, while only 18.33% have made order transactions through their own applications or websites. Thus, e-commerce has been used mainly for purchasing goods and services rather than online sales. Other 21.95% of respondents don't use e-commerce at all, because of the lack of a global e-commerce strategy, lack of knowledge of foreign languages, or because they prefer to have direct contact (face to face) with their customers.
- Only 30.65% of respondents have a business website, which greatly limits transactions through e-commerce.
- Only a small part of businesses (28.23%) use social networks, mainly Facebook or LinkedIn. Own blogs or such networks as Twitter are used by 19.35% of the respondents.
- Digital tools are underused by businesses, because they think that using digital tools require a lot of dedication and are too complicated. Also, the majority of Granada businesses are self-employees, which don't have much time to manage and keep digital tools updated.
- From 40% of non-users of digital security tools, slightly more than 70% are unaware of them or lack experience and prefer not to use them at all.

- Around a half of respondents (53.06%) are aware of a lack of cooperative digitalization strategy. Only 14.29% of respondents have implemented such a strategy, while 22.45% are planning to implement their own digitalization strategy during the next 3 years.
- Slightly less than a half of businesses (40.82%) have workers with a basic digital knowledge and only one fifth (24.49%) have employees with an advanced level of digital skills. 16.33% of Grenadian companies hire IT professionals, most likely to manage the SEO, websites and social networks.
- Respondents are unaware about their needs to enhance the digital transformation, which shows a lack of awareness about advantages of digitalization. Most of the business owners have expressed a need for digitalization support programs for both employees and managers (24%), as well as a basic training (20%). Individualized business consultations advising tailored measures, as well as manuals about digitalization requirements and practical examples on how digitalization can improve a company (16%) are also considered useful.

Norte, Portugal

- Most companies have access to a high-speed internet connection, while 12% of respondents report about too slow internet connection, while only about half of the respondents are satisfied with their internet connection. Without a precise connection speed measurement and infrastructure information, it is unclear whether some of these connections are indeed fast and reliable or even appropriate for each individual case.
- Respondents have various individual choices regarding the digital technologies planned to be introduced in the next three years (Sensors, Wireless Technology, Databases, Cybersecurity). Therefore, it shows that there is an absence of a clear roadmap to complete a smooth digital transition. Regarding the use of IT solutions/services the recognizable transversal baseline of key IT services should be easily identifiable and their introduction is planned within the next 3 years.
- The main reasons why companies haven't introduced digital solutions (nor planning to do it in 3 years) is the high cost of implementation and a technologically unskilled workforce.
- A majority of businesses use online banking services (~87%), and half of those who don't use, state that they don't need them.
- Most businesses (70%) use public service portals and free public tools electronically available giving preference to services like *espaço-empresa* and digital signature. Those, who don't use public services, say they never heard of them, they aren't required by public entities or don't need them at all.
- Around three quarters of the region's businesses have used e-commerce services, to buy or sell online, or another e-commerce feature. The main reasons non-use of e-commerce are related to logistics and lack of skilled workforce.
- The use of communications and social media tools in today's world is very much widespread and well recognized by the majority regional businesses (~85%) giving priority to Facebook.
- Only a half of businesses admit that they use some sort of digital security measures, while only a few of them (~7%) provide a training in cybersecurity for their employees.
- Most businesses consider that their employees have at least basic digital skills.
- Most businesses don't have a digital transformation plan (41%) and they lack skilled workforce for implementing digital transformation.
- Businesses lack an awareness and general understanding about the benefits of digitalization.

Austria

- All participating SMEs and start-ups acknowledge the importance of digitalization for their enterprise and agree that the use of digital tools and solutions will promote their business activities.
- Companies perceive that the main benefits from digitalization are related to acquisition of new clients (25%); increase of their turnover/profit (15%); an increase of visibility (10%); and their service quality for clients (13%).
- Main internet connections used by the companies are high speed broadband (50%), mobile connection (27%) and cable connection (19%).
- Majority of enterprises (75%) declare that their internet connection is sufficient for everyday business. 15% state that they would prefer a faster internet connection but think that this is too costly for them. 10% state that their internet connection is not sufficient for their everyday business, because of an underdeveloped infrastructure. No company, however, stated that an internet connection would be unimportant.
- Digital technologies that already are mainly used in companies are wireless technologies, such as wi-fi (30%), databases (12%) and cloud computing (12%), and robotics (7%).
- Part of respondents (22%) use data storage (i.e. Dropbox, One Drive, Google Docs), another 22 % use e-billing, 18% use online solutions for services (e-sales), 15% apply direct marketing solutions (i.e. CRM). Approximately about one tenth of the enterprises uses search engine optimization (SEO), (i.e. MailChimp) respectively cloud computing.
- Almost all of respondents (90%) are planning to introduce new digital technologies, solutions or services over the next three years mentioning a broad range of digital technologies. The top desired technologies are security/scripting (19%), machine learning/artificial intelligence (13%), Big Data (8%) and Augmented Reality (8%).
- Only a few enterprises don't intend to introduce digital technologies at all because they consider these technologies as unimportant for their business activities or a lack of relevant information.
- There are sample enterprises, which use a broad range of existing or planned IT solutions and services. They could be used as good practices and as testimonials for awareness raising activities.
- A large majority of three out of four companies use (free) public services' portals or public electronic tools – mainly digital signature (e-signature, handy-signature) (40%), public portals (e.g., www.oesterreich.gv.at) (44%) and the citizens card (*Bürgerkarte*) (17%). Only 3 enterprises stated that they do not know anything about these public portals and tools.
- E-commerce services and the internet for buying and selling goods and services are widely used among the participating enterprises (75%) giving priority to online orders, reservations and bookings, e.g., through a shopping cart on the website of the enterprise. Around one fifth of companies sell and buy goods and services on an international basis. The main reason why e-commerce is not used by companies seems to be the fact that there is no overall strategy for digitalization and e-commerce.
- Three out of four companies use social media tools, mainly company websites, blogs, social networks and search engines.
- Only few companies use digital security solutions, mainly for data protection for all devices, ongoing data backup, password protection and prevention of online attacks through antivirus systems and firewalls.

- The results of the survey show a lack of company-wide digitalization strategies. A half of respondents don't have such a strategy, and only 2 enterprises have already prepared it. Around 40% of respondents mention that they are planning to develop a digitalization strategy within the next 3 years.
- Almost a half of the respondents indicate that their employees have above average digital skills (i.e., they use digital solutions for data exchange, bookkeeping, digital marketing and within their buying and sales departments, 30% assess their digital skills as basic (e-mail, internet search, social networks), 14% think that their employees are IT-experts.
- Companies need support programmes for employees and managers, tailor-made consulting and training as well as practical handbooks and leaflets.

Overall conclusions

1. The importance of digitalization for the development of the economy and own company has been recognized by most of the respondents, except those which are in disadvantaged positions due to poor infrastructure (Basilicata, Italy). They also recognize challenges which the digital transformation presents.
2. All respondents recognize the importance of an internet for everyday businesses. A part of respondents with poorer connections expresses the requirement for faster and elaborated connections.
3. Main benefits seen from the digitalization are related to client acquisition, improvement of service quality, visibility and, therefore, increase in turnover and profit rather than technological change, innovation and increased efficiency.
4. Around three quarters of interviewed businesses of the Norte Region (Portugal), Granada Region (Spain) and Austria admit that they have used e-commerce services, to buy or sell online, or another feature associated with these services. Still, e-commerce is being mainly used for purchasing, not selling goods and services, as it is in the case of other DigiBEST partners as well.
5. The most often mentioned reasons, why companies that don't use e-commerce are mainly related to logistics and lack of skilled workforce, as well as restrictions from partners and customers, safety reasons, there is not an overall strategy for e-commerce, lack of knowledge of foreign languages, or because businesses prefer to have direct contact (face to face) with their customers.
6. Respondents of all partners' regions and countries recognize the importance of internet banking and use of free online public services, while social networks aren't widely used everywhere, which depends on the capability of a company to sustain their own websites.
7. The frequent use of public networks and (free) public electronic tools can be seen as a comparative advantage for Austrian, Latvian and Norwegian companies, which have the highest level of users of free online public services. In the case of other partners, Basilicata, Norte and Granada regions, still quite many companies are unaware of the availability of free public online services and don't use them.
8. The lack of a strategy for digitalization, as well as digital security strategy, on a company level is an obstacle for digital transformation of businesses in all partner regions and countries. In cases of Austria and Granada Region, also the importance of e-commerce strategy is being stressed.

9. All partners report a need for companies to improve digital skills of their employees, as well as a need to hire external IT specialists. Employees of companies need basic or above basic digital skills, also managerial skills are very often needed to promote digitalization, as well as implement strategies in the companies.
10. There are different needs defined by partners to facilitate the digital transformation of their SMEs and microenterprises. Among the most often mentioned are support programs for management and employees; training programs to develop digital skills; individually tailored consultations; handbook with recommendations with practical examples, how the digitalization can improve businesses and/or brochures with information about different digital solutions, as well as networks to exchange experience and awareness rising measures.
11. Financial and practical support for enterprises, as well as an efficient broadband connection, are also required.

8. Main findings and conclusions

The DigiBEST project implementation coincides with the global spread of the COVID-19 pandemics, which has completely changed the existing situation and led to new challenges. Sustainability and maintaining the competitiveness of SMEs and microenterprises has become more important than ever. This has been estimated that **COVID-19 pandemics has accelerated digitalization by 5.3 years**

The evidence shows that **there hasn't been enough flexibility or skill of SMEs and microenterprises to adapt to this new situation in 2020**. **Additional support for taking up technology and upgrading training programs to equip their workers with necessary skills is very much needed.** Therefore, findings and conclusion of the DigiBEST research could also help to find new efficient solutions for SMEs and microenterprises to deal with the COVID-19 crisis and its consequences.

The COVID-19 pandemic has stopped all doubts about the necessity of digital transformation to business longevity. It has been proven that **many more jobs (41% - 51%) can be done remotely**.

The COVID-19 has **created new opportunities for entrepreneurs. However, the gap between companies that successfully use digital technologies and adapt to the situation, and those who wait for "old times" is widening.**

The necessity to ensure the continuation of economic activity and growth **has significantly increased the role of policy and public authorities for sustaining the viability and existence of business. Ensuring competitive digital infrastructure, as well as tackling existing barriers to digital transformation, has become more important than ever for achieving sustainable economic development.**

The overall trend of **GDP growth** in DigiBEST partners' regions/countries over the five years' period (2014-2018) shows that it has reached top levels in 2017 and/or 2018. The highest average GDP growth among the DigiBEST partners' regions/countries during the period (2014-2018) was achieved by Latvia (3.18%), which was higher than the EU-28 average GDP growth (2.14%) during the same period. The economic growth has experienced slowdown in 2020 due to the COVID-19 pandemic crisis all over the World. This is expected that the economic recovery will start in 2021 and that growth rates will return to positive in all DigiBEST partner countries.

During the period of six years (2014-2019) the **unemployment rate** has declined in the case of all DigiBEST partner regions/countries, although, the unemployment indicators varied a lot. The highest unemployment rates have been in the Andalucía region during the whole period reducing from 34.7% in 2014 to 21.2 in 2019. The lowest unemployment rates have been in the Trøndelag region – 3.8% in 2014 and 2019 with small shifts in between the period (2014-2019). The COVID-19 pandemic crisis has resulted in increased unemployment levels all over the EU and beyond during 2020.

According to the **distribution of enterprises** in the DigiBEST partners' regions/countries, **the majority of enterprises in 2017 were microenterprises**. The greatest shares of microenterprises were in Latvia, where they represented 88% (70 733) of all enterprises; Andalucía region, where microenterprises represented 92% (227 189) of all enterprises; and Basilicata region, where microenterprises were also 92% (12 432) of all enterprises. At the same time the greatest share of SMEs (with 10 to 250 persons employed) was in the Trøndelag region, where SMEs represented 23% (2 503) of all enterprises.

In terms of employment SMEs played a greater role than microenterprises in all DigiBEST partners' regions/countries. In the Andalucía and Basilicata regions employment is almost equally distributed between SMES and microenterprises. In Austria, Latvia and the Norte region most people are employed by SMEs.

The current crisis is having an important impact on key societal indicators, relating to the use of internet services by citizens, which does not yet show in the latest 2019 official statistics as reported

in DESI. There have been additional measures implemented to reinforce the digital infrastructure due to the strained demand were put in place. In many cases, the provision of online education resources and digital public services were developed or improved to promote digital inclusion. Likewise, **the support to digitisation of businesses, particularly of SMEs, was accelerated in areas such as e-commerce, teleworking or online training. Cybersecurity and the fight against fake news or online shopping scams was also a priority. Efforts also concentrated on the promotion and funding of research activities using advanced digital technologies and infrastructure**.

From the perspective of the DigiBEST project partners' countries, **Norway is an absolute leader in overall performance in digitalization**. Partner countries – Norway, Spain and Austria perform above the EU average, while Latvia, Portugal and Italy are below the EU digital average.

Despite a very good or relatively good performance of the DigiBEST partner countries DESI or its five dimensions, a comparative analysis of strengths and weaknesses reveals that **all partner countries experience weaknesses in such DESI dimension – integration of digital technology by business or digitization of businesses**, where scores are from 31.2 in case of Italy to 59 in case of Norway. **The strongest DESI dimension for all DigiBEST partner countries is in the digital public services.**

Overall results of the IMD World Digital Competitiveness Ranking show that **countries which maintain efficient use of digital talent, effective regulation frameworks and a quick adoption of new technologies are showing the best performance in terms of digital competitiveness**. These abilities will also be very important during the process of economic recovery after the COVID-19.

During the 6 years' period (2014-2019) the **household access to internet at home** has gradually increased in cases of all DigiBEST partners' regions/countries reaching 100% in the case of Trøndelag, Norway in 2016 and then dropping back to 96% in 2019. The lowest indicators in terms of the internet access at home in 2019 were in the cases of Norte, Portugal (78%) and Basilicata, Italy.

With increasing access to the internet and broadband the number of **individuals regularly using the internet** was consequently gradually increasing during the analysed period (2014-2019). This indicator has increased in all DigiBEST partners' regions/countries reaching 99% in the case of Trøndelag, Norway in 2016 and then dropping back to 95% in 2019. The lowest indicators in terms of individuals regularly using the internet in 2019 were in the cases of Norte, Portugal (67%) and Basilicata, Italy (66%).

During the period of time from 2014 to 2019 a number of **individuals, who accessed the internet away from home or work,** had increased in all DigiBEST partners' regions/countries. The greatest increase in a number of individuals, who accessed the internet away from home or work, was in the case of Latvia, where it had increased by 32% from 35% in 2014 to 67% in 2019.

Despite a gradual decrease in a number of **individuals, who have never used a** computer during the period of time from 2014 to 2019, there were still quite many individuals in Norte, Portugal (28%) and Basilicata, Italy (23%) in 2019, who haven't used a computer. This indicator has greatly improved (by 18%) in the case of Basilicata, Italy, where a number of individuals who have never used a computer had decreased from 41% in 2014 to 23% in 2019 and in a case of Andalucía, Spain (by 17%), where a number of individuals who have never used a computer had decreased from 25% in 2014 to 9% in 2019. At the same time there was only 1% of individuals who have never used a computer in Trøndelag, Norway in 2016.

A number of **individuals, who were selling goods or services over the internet,** had shifted up and down in all DigiBEST partner countries during the analysed period (2014-2019). This indicator had shown a slight increase in 2019 if compared with 2014 in all DigiBEST partners' regions/countries, except Basilicata, Italy, where it decreased from 7% in 2014 to 5% in 2019. However, internet sales are still comparatively low in all DigiBEST partners' regions/countries, where Trøndelag, Norway is leading with 29% of internet sales (2019) down to Basilicata (Italy) with only 5% of internet sales in

2019. **This indicator shows that e-commerce is the greatest problem in all DigiBEST partner regions/countries that needs to be improved.**

During the analysed period (2014 – 2019) a number of **individuals, who used the internet for interaction with public authorities,** has also been increasing in Austria, Andalucía (Spain), Latvia and Trøndelag (Norway). At the same time this indicator has been quite low in the case of Basilicata (Italy) remaining at the same 17% level in 2019 as in 2014 with some increase during the period (2014-2019). And in the Norte, Portugal, the interaction with public authorities has increased by only 1% from 35% in 2014 to 36% in 2019 with some upward shifts in 2016 (39%) and 2017 (40%).

During the period of time from 2014 to 2019 a number of **individuals, who used the internet banking,** has increased in all DigiBEST partners' regions/countries reaching 94% of individuals in Trøndelag, Norway (2019). Still, the use of internet banking is still quite low in Basilicata, Italy – 20% in 2019 and Norte, Portugal – 37%.

On the overall, during the period of time from 2014 to 2019 a number of **individuals, who used the internet for participating in social networks,** has been slowly increasing in all DigiBEST partners' regions/countries reaching 84% of individuals in Trøndelag, Norway (2019). The use of social networks is still quite low in Basilicata, Italy, where only 39% of individuals were using social networks in 2019.

The SWOT analysis demonstrates that **the most common weaknesses** (challenges) that face DigiBEST partner regions or countries in SMEs digital transformation process are related to low awareness about digital solutions and their benefits, the digital solutions are considered as expensive investment (often preconceived assumption). And the most vulnerable in terms of digital transformation are micro and small companies, specifically those located in rural areas or representing specific sector, that are lacking digital knowledge and skills, capacity and resources to invest in digital technologies and afford ICT experts to design and lead digital strategy in enterprise.

There is also an insufficient ICT or connectivity infrastructure, mostly due to the region specific type of territory (mountainous terrain or widely spread rural areas, where urban-rural divide is observed), as well as the limited cooperation between SME's and the R&D environment and low innovation performance of SMEs.

In the ICT market, the supply does not meet demand, where one of the reasons is that SMEs haven't identified their business needs and they don't know what kind of products/services to order from IT specialists.

Overall, the consequence of above-mentioned challenges is a low level of integration of digital solutions in SMEs. A full description of the weaknesses as well as strengths in business digital transformation is provided in the DigiBEST partners' SWOT tables, please the Attachment 3.

The analysis of identified barriers for the digitalization of SMEs and microenterprises has revealed that there are a lot of similarities. Thus, this has been possible to categorize partners' proposed solutions according to the following categories:

1. Awareness rising & collaboration;
2. Enabling corporate environment & capacity building;
3. Administrative & technical & legal obstacles;
4. Financial & economic barriers;
5. Policy and security barriers.

For the category "Awareness rising and collaboration" the most often named barriers are **low digital maturity** of SMEs that presents the major problem for digitalization. Other more often named

problems are related to **lack of digital skills and employees with such skills, gaps in ICT education, lack of awareness and insufficient cooperation**. **Low performance of e-commerce** is another barrier or consequence of existing problems mentioned by the DigiBEST partners.

The above-mentioned barriers could be solved by interacting through **proposed solutions** in the following categories: **Digital education, skills and accessibility of skilled workforce; Dissemination of information, communication and awareness rising; Services and support programmes for SMEs digitalization; and Policy level initiatives**.

For the category "Enabling corporate government and capacity building" the most often named barriers are **lack of skills, knowledge and competence** of SMEs that presents the major problem for digitalization. Other the most often mentioned problems are related to **insufficient support resulting in a low innovation potential**.

The above-mentioned barriers could be solved by interacting through **proposed solutions** in the following categories: **Training, qualification and ICT competence; Business and legal incentives; and Awareness rising and collaboration**.

For the category "Administrative, technical and legal obstacles" the most often names barriers are **shortages in legislation and policy making, bureaucracy, and infrastructure**. All of these barriers should be solved on national, regional or local government levels, or even EU level. Only some of these problems are related to the business level. The EU level proposal concerns implementing a common European regulatory framework to make easier the access to digitalization for SMEs.

The above-mentioned barriers could be solved by interacting through **proposed solutions** in the following categories: **Administrative and legal issues; Infrastructure and technical issues; and EU level issues.**

For the category "Financial and economic barriers" the **Access to financing and resources** is the main barrier for all DigiBEST partners in this category. Also, the **lack of information about funding possibilities** is among the most often mentioned barriers.

Most of the **proposed solutions** in this category should be solved on national or local governmental levels and others in cooperation with private partners. The above-mentioned barriers could be solved by interacting through proposed solutions in the following categories: **Governmental level initiatives and solutions; Credit lines and private incentives; Awareness rising actions**.

For the category "Policy and security barriers" such barriers as **shortages of policy and regulatory framework, brain drain, risks of the concentration of digital skills only in urban areas and large companies** are among the most often mentioned by the DigiBEST partners.

All of the **proposed solutions** should be solved on national or local governmental levels, as well as the EU level. The EU level proposal concerns **conducting the joint European fight against cybercrime**. The above-mentioned barriers could be solved by interacting through proposed solutions in the following categories: **Administrative and legal issues; Financial issues; Support for businesses; EU level issues**.

In general, according to the analysis of barriers and solutions, the following **conclusions about the state of digitalization of the DigiBEST partners** can be made:

- The COVID-19 pandemic has revealed all problems of the **digital transformation of SMEs and the use of digital tools is enabling many economies to perform also during the COVID-19 pandemics and related shutdowns**.
- Governments are increasingly stressing **the importance of the digital transformation of SMEs and microenterprises**.

• **Connectivity and accessibility** continues to improve in PP regions/countries, but important barriers of SMEs digitalization remain – across and within regions and countries, and enterprises.

• **E-commerce has become so important that never before and, together with digital solutions and strategies, it can bring new opportunities for businesses and consumers, as well as new challenges for security and privacy.**

In order to learn from each other, DigiBEST partners have proposed examples of Good Practices that already have proved to be successful in their regions or countries. These examples can serve as a source of inspiration to address the identified challenges and barriers. The **pool of DigiBEST Good Practices offers 20 different initiatives** of such measures as collaboration models (public-private), digital innovation hubs, consultation offices or services, training programmes, advisory or mentoring programmes, funding programmes, tools for assessment of digital maturity and recommendations or plans with specific actions and other activities facilitating business digitalisation.

The policy analysis reveals that All DigiBEST partners, except Norway, have **Smart Specialization Strategies** on national or regional levels (NUTS 2). In all cases, the ICT is one of the focus areas of Smart Specialization Strategies included as a separate priority (Andalucía, Spain) or as a cross-sectoral priority in other cases.

The only DigiBEST partner that has a **national level strategy for digitalization** of enterprises is Austria with its *Digital Strategy for Austria* or *Digital Austria Initiative.* Several other DigiBEST partners have **regional level strategic documents** for promoting business digitalization: 1) Trøndelag County Council on 2019 has adopted a special *Action program for Strategy for innovation and value creation in Trøndelag 2020-2021;* 2) Special strategies for promoting the digitalization of business of the Andalucía Region are *Andalusia Industrial Strategy (AIS)* and *Impulse Strategy of the ICT sector (TIC 2020).*

In all DigiBEST partner countries/regions, which are EU member states, **the ICT and digitisation are priorities of the Operational Programmes 2014-2020**, which tackle the ICT development for promoting the ICT uptake, information society and ICT infrastructure development under its second Thematic Objective with the support of the ERDF. At the same time the competitiveness of enterprises is tackled under the OP third Thematic Objective (2014-2020).

All DigiBEST partner countries have various **support instruments and measures used for the digitalization of SMEs**, which differ according to the scale and scope. There are a lot of examples how national and regional governments can support and promote the digitalization of SMEs, which can be used for mutual learning and knowledge transfer.

The analysis of the DigiBEST **Business Digital Transformation Assessment survey and its overall conclusions** presented in the Part 7 shows that:

1) Businesses still perceive **main benefits of the digitalization** from client acquisition, improvement of service quality, visibility and, therefore, increase in turnover and profit rather than technological change, innovation and increased efficiency.

2) The **e-commerce** is being mainly used for purchasing, not selling goods and services. The most often mentioned reasons, why companies that don't use e-commerce are mainly related to logistics and lack of skilled workforce, as well as restrictions from partners and customers, safety reasons, lack of an overall strategy for e-commerce, lack of knowledge of foreign languages, or preferred direct contacts with their customers.

3) The **lack of a strategy for digitalization, as well as digital security strategy**, on a company level is recognized as an obstacle for digital transformation of businesses. In some cases, also the importance of e-commerce strategy is being stressed.

4) **Digital skills**, as well as a necessity to hire external IT specialists are recognized as important obstacles for the digital transformation of companies. At the same time enterprises sometimes also lack managerial skills that are very often needed to promote digitalization, as well as implement strategies.

5) The most required **support measures for the digital transformation** could be support programs for management and employees; training programs to develop digital skills; individually tailored consultations; handbook with recommendations with practical examples, how the digitalization can improve businesses and/or brochures with information about different digital solutions, as well as networks to exchange experience and awareness rising measures.

9. Recommendations

Taking into account different strengths and weaknesses of the DigiBEST partner countries according to the five dimensions of DESI, project partners who perform weaker in some dimensions shall learn from those, which have higher scores.

Similar recommendation relates to the results of the IMD World Digital Competitiveness Ranking which shows different performance of strengths and weaknesses of the DigiBEST partner countries in the following categories: efficient use of digital talent, effective regulation frameworks and a quick adoption of new technologies that are crucial for digital competitiveness. Here, partners with weaker performance in some categories shall use an opportunity to learn from partners, which have higher performance indicators.

Taking into account findings of the analysis of digitalization in the DigiBEST partner countries, as well as challenges presented by the COVID-19 pandemics, all partners shall put an additional effort in improving skills and knowledge of SMEs related to digital entrepreneurship and e-commerce, which also require additional attention on the digital security and online safety measures.

Some of the DigiBEST partners shall pay special attention for promoting the use of internet for interaction with public authorities and the use of internet banking, as well as increase the use of social networks.

According to the analysis of identified barriers for the digitization of SMEs and microenterprises DigiBEST partners partially have similar or related barriers that could be solved through common solutions. Therefore, this could be worthwhile for partners to investigate how others have dealt with common problems and take over these learnings to their countries. Proposed solutions could bring new ideas for dealing with identified solutions, as well provide an added value for partners' Action Plans.

Also, solutions to deal with existing barriers can also be identified in proposed Good Practice of project partners, investigating support policies and instruments for promoting digitalization of SMEs in DigiBEST partner countries/regions, as well as during study visits and Peer Reviews.

Taking into account that the new EU funds programming period (2021-2027) has already started lessons learnt during the implementation of DigiBEST project must be taken forward and used to improve new policy instruments.

The awareness raising activities and measures must be focused on changing the mind-set of entrepreneurs about the benefits of digitalization and their importance for increasing competitiveness and maintaining sustainability in order to promote the digital transformation of entrepreneurship.

The priority of digital transformation of enterprises must be e-commerce focusing on promoting online selling. Support measures for promoting it should focus on different needs of individual

entrepreneurs. In addition, enabling environment, legislative measures and efficient infrastructures need to be in place to foster e-commerce development.

Support providers must enable businesses to adopt enterprise level digitalization strategies and digital security strategies to promote their digital transformation. Also, the existence of e-commerce strategy could be considered.

The effort to improve the level of digital skills of entrepreneurs and availability of digitalisation specialists in enterprises must continue providing basic, middle level, as well as advanced skills according to the needs of individual enterprises. It should be noted that, especially in a case of microenterprises and smaller SMEs, managerial skills are crucial to promote their digital transformation.

DigiBEST partners should take into account results of the survey with respect to support instruments required for the digital transformation, which especially emphasize needs related to support programs for management and employees; training programs to develop digital skills; individually tailored consultations; handbook with recommendations with practical examples, how the digitalization can improve businesses and/or brochures with information about different digital solutions, as well as networks to exchange experience and awareness rising measures.

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Bibliography

Agaz Consultores (2010), *DipuDiagnóstico del tejido empresarial de Granada (pag12).* Retrieved from: https://www.granadaempresas.es/wp-content/uploads/2016/12/diagnostico-del-tejido-empresarial-de-la-provincia-de-granada-0.pdf

Comissão de cooordenação e desenvolvimento regional do Norte, *RIS3 Norte 2020*. Retrieved from: https://norte2020.pt/sites/default/files/public/uploads/documentos/norte2020_ris3.pdf

CRE:HUB (2018), *CRE:HUB Joint Report on Cultural and Creative Industries*. Retrieved from: https://www.interregeurope.eu/crehub/news/news-article/3756/cre-hub-state-of-art-joint-report/

Dannenberg, P., Fuchs, M., Riedler, T., Wiedemann, C. (2020*), Digital Transition by COVID19 Pandemic? The German Food Online Retail.* Tijdschrift voor Economische en Sociale Geografie, 111(3), 543-560. Retrieved from: https://onlinelibrary.wiley.com/doi/full/10.1111/tesg.12453

Deloitte.Legal (2020), *Accelerate digitization to increase resilience. A global COVID-19 response for legal leaders*. Retrieved from: https://www2.deloitte.com/content/dam/Deloitte/global/Documents/Legal/dttl-legal-covid-respond-legal-digitization.pdf

Dingel, J.I., and B. Neiman. (2020), *"How Many Jobs Can Be Done at Home?"* NBER Working Paper No. 26948. Cambridge, MA: National Bureau of Economic Research. Retrieved from: https://www.nber.org/papers/w26948

European Commission (2018), *eGovernment in Austria (May 2018*), Luxembourg. Available at: https://joinup.ec.europa.eu/sites/default/files/inline-files/eGovernment_in_Austria_2018_vFINAL.pdf

European Commission (2019), *Annual Report on European SMEs 2018/2019*. Research, Development and Innovation by SMEs. Background Document, EC November 2019. Retrieved from: https://ec.europa.eu/growth/smes/sme-strategy/performance-review_en

European Commission (2019), *Regional Innovation Scoreboard Italy 2019.* Retrieved from: https://ec.europa.eu/docsroom/documents/36286

European Commission (2019), *Regional Innovation Scoreboard.* Retrieved from: https://ec.europa.eu/growth/sites/growth/files/ris2019.pdf

European Commission (2019), *RIS 2019*. Retrieved from: https://ec.europa.eu/growth/industry/policy/innovation/regional_en

European Commission (2020), *A European strategy for data,* COM(2020) 66 final. Retrieved from: https://ec.europa.eu/info/sites/info/files/communication-european-strategy-data-19feb2020_en.pdf

European Commission (2020), *An SME Strategy for a sustainable and digital Europe*, COM(2020) 103 final. Retrieved from: https://ec.europa.eu/info/sites/info/files/communication-sme-strategy-march-2020_en.pdf

European Commission (2020), *Austria - Investments and infrastructure.* Retrieved from: https://ec.europa.eu/transport/facts-fundings/scoreboard/countries/austria/investments-infrastructure_en

European Commission (2020), *Basilicata profile*. Retrieved from: https://ec.europa.eu/growth/tools-databases/regional-innovation-monitor/base-profile/basilicata

European Commission (2020), *DESI Austria 2020* - https://ec.europa.eu/digital-single-market/en/news/digital-economy-and-society-index-desi-2020

European Commission (2020), *Desi index Spain*. Retrieved from: https://ec.europa.eu/digital-single-market/en/scoreboard/spain

European Commission (2020), *Desi Index, Latvia 2020*. Retrieved from: https://ec.europa.eu/digital-single-market/en/scoreboard/latvia

European Commission (2020), *Digital Economy and Society Index (DESI) 2020*. Retrieved from: https://ec.europa.eu/digital-single-market/en/news/digital-economy-and-society-index-desi-2020

European Commission (2020), *Digital Public Administration factsheet 2020 Austria*. Retrieved from: https://joinup.ec.europa.eu/sites/default/files/inline-files/Digital_Public_Administration_Factsheets_Austria_vFINAL_2.pdf

European Commission (2020), *European Economic Forecast*. Autumn 2020, Luxembourg: Publications Office of the European Union, 2020, p.1. Retrieved from: https://ec.europa.eu/info/sites/info/files/economy-finance/ip136_en_2.pdf

European Commission (2020), *European Innovation Scoreboard 2020*. Retrieved from: https://ec.europa.eu/commission/presscorner/detail/en/QANDA_20_1150

European Commission (2020), *shaping Europe's digital future – Norway*. Retrieved from: https://ec.europa.eu/digital-single-market/en/scoreboard/norway

European Commission (2020), *Shaping Europe's digital future (COM(2020) 67 final)*. Retrieved from: https://ec.europa.eu/info/sites/info/files/communication-shaping-europes-digital-future-feb2020_en_3.pdf

European Commission (2020), *The Digital Economy and Society Index (DESI) 2020*. Retrieved from: https://ec.europa.eu/newsroom/dae/document.cfm?doc_id=67086

European Commission (2020), *White Paper on Artificial Intelligence - A European approach to excellence and trust*, COM(2020) 65 final. Retrieved from: https://ec.europa.eu/info/sites/info/files/commission-white-paper-artificial-intelligence-feb2020_en.pdf

European Commission, *DESI 2020 Portugal.* Retrieved from: https://ec.europa.eu/digital-single-market/en/scoreboard/portugal

European Commission, *Digital Economy and Society Index (DESI) 2020 – Italy*. Retrieved from: https://ec.europa.eu/digital-single-market/en/scoreboard/italy

European Commission, *New Cohesion Policy*. Retrieved from: https://ec.europa.eu/regional_policy/en/2021_2027/

European Commission, *Smart Specialization Platform.* Retrieved from: https://s3platform.jrc.ec.europa.eu/regions/at

European Commission, *The Digital Economy and Society Index (DESI)*. Retrieved from: https://ec.europa.eu/digital-single-market/en/digital-economy-and-society-index-desi

Gallacher, G., Hossain, I. (2020), *Remote work and employment dynamics under COVID-19: Evidence from Canada*. Canadian Public Policy, 46(1), 44-54. Retrieved from: https://www.utpjournals.press/doi/full/10.3138/cpp.2020-026

Gebauer, H., Fleisch, E., Lamprecht, C., & Wortmann, F. (2020), *Growth paths for overcoming the digitalisation paradox*. Business Horizons. Retrieved from: https://doi.org/10.1016/j.bushor.2020.01.005

Gopinath, G., A (2020), *Long, Uneven and Uncertain Ascent*. Retrieved from: https://blogs.imf.org/2020/10/13/a-long-uneven-and-uncertain-ascent/

IMD (2020), *IMD world digital competitiveness ranking 2020*, Retrieved from: https://www.imd.org/wcc/world-competitiveness-center-rankings/world-digital-competitiveness-rankings-2020/

IMF (2020), *World Economic Outlook, October 2020: A Long and Difficult Ascent*, IMF: Washington D.C., Retrieved from: https://www.imf.org/en/Publications/WEO/Issues/2020/09/30/world-economic-outlook-october-2020

Junta de Andalucia (2020), *Estrategia de infraestructuras de telecomunicaciones de Andalucia 2020 (page 17).* Retrieved from: https://www.juntadeandalucia.es/export/drupaljda/esita_2020.pdf

Junta de Andalucía, *2020 Digital Business Plan. PAED (page 8), datas from June 2015.* Retrieved from: https://www.juntadeandalucia.es/export/drupaljda/Memoria%20Plan%20EmpresaDigital.pdf

Junta de Andalucía, *Plan de Infraestructuras del Transporte y Movilidad de Andalucía (PITMA) 2021-2027 (page 1).* Retrieved from: https://www.juntadeandalucia.es/export/drupaljda/doc_resumen_diagnostico_pitma_21_27.pdf

LSE (2011), *evaluation of the main achievements of cohesion policy programs and projects over the longer term in 15 selected regions*. Retrieved from: https://ec.europa.eu/regional_policy/sources/docgener/evaluation/pdf/eval2007/cohesion_achievements/basilicata.pdf

Nordregio (2018), The potential of Smart Specialisation for enhancing innovation and resilience Nordic regions. Retrieved from: https://www.nordregio.org/wp-content/uploads/2018/02/The-potential-of-Smart-Specialisation-for-enhancing-innovation-and-resilience-in-Nordic-regions-1.pdf

OECD (2020), *OECD Digital Economy Outlook 2020.* Retrieved from: http://www.oecd.org/publications/oecd-digital-economy-outlook-2020-bb167041-en.htm?utm_source=Adestra&utm_medium=email&utm_content=deo-report&utm_campaign=What%27s%20New%20-%2027%20Nov%202020&utm_term=pac

OECD 28th Territorial Development Policy Committee (2012), *Public Investment across Levels of Government: The Case of Basilicata, Italy.* Retrieved from: http://www.oecd.org/cfe/regionaldevelopment/basilicata_edited.pdf

Rapaccini, M., Saccani, N., Kowalkowski, C., Paiola, M., Adrodegari, F. (2020), *Navigating disruptive crises through service-led growth: The impact of COVID-19 on Italian manufacturing firms.* Industrial Marketing Management, 88, 225-237. Retrieved from: https://www.sciencedirect.com/science/article/pii/S0019850120304247

Statistics Vienna (2020), *Vienna in Figures2020*. Retrieved from: https://www.wien.gv.at/statistik/pdf/viennainfigures-2020.pdf

Trøndelag County Council (2019), *Trøndelag in Numbers*. Retrieved from: https://www.trondelagfylke.no/contentassets/ee663ed54e2c4545a5eb95df0f6f7e0f/trondelag-i-tall-2019.pdf

Trøndelag fylkeskommune (2019), *Action program 2020-2021- for the strategy "Value Creatin Trøndelag"*. Retrieved from: https://www.trondelagfylke.no/contentassets/b91afe6250b342e9b2d73dc270993796/handlingsprogram-politisk-vedtatt-en-final-13.02.20.pdf

Websites

Austria.info, *Flights*. Retrieved from: https://www.austria.info/en/service-and-facts/getting-there-around/flights

Austria's digital office. Retrieved from: www.help.gv.at

Britannica, *Transportation and telecommunications*. Retrieved from: https://www.britannica.com/place/Austria/Transportation-and-telecommunications

Central Statistical Burau of the Republic of Latvia (2020), *Key entrepreneurship indicators of enterprises by number of employees*. Retrieved from http://data1.csb.gov.lv/pxweb/lv/uzn/uzn__uzndarb/SBG020.px/ , viewed on 12.12.2020

Central Statistical Burau of the Republic of Latvia (2020), *Population, population change, and key vital statistics*. Table: ISG010. Retrieved from: https://data1.csb.gov.lv/pxweb/lv/iedz/iedz__iedzskaits__ikgad/ISG010.px/

Company Service Portal. Retrieved from: www.usp.gv.at

Diputación de Granada (2020), *El 82% de la población de Granada vive en el Área Metropolitana y la Costa*. Retrieved from: https://www.andaluciarural.org/el-82-de-la-poblacion-de-granada-vive-en-el-area-metropolitana-y-la-costa/

ELGA (electronic health records). Retrieved from: http://www.elga.gv.at/en/about-elga/

Empresa Exterior (2019), *Solo el 8% de las empresas españolas tiene actividad internacional*. Retrieved from: https://empresaexterior.com/art/70654/solo-el-8-de-las-empresas-espanolas-tiene-actividad-internacional

European Commission (2020), *SME Definition*. Retrieved from: https://ec.europa.eu/growth/smes/sme-definition_en, viewed on 1.05.2020

Eurostat (2020), *Advanced technologies*. Retrieved from: https://ec.europa.eu/growth/industry/policy/digital-transformation_en

Eurostat (2020), *Business demography by size class and NUTS 3 region*. Table: BD_SIZE_R3. Retrieved from: https://ec.europa.eu/eurostat/databrowser/bookmark/b0b9b22e-f107-4229-b3bb-a3a19b61f0f5?lang=en , viewed on 27.12.2020

Eurostat (2020), *Gross domestic product (GDP) at current market prices by NUTS 2 regions*. Retrieved from: https://ec.europa.eu/eurostat/databrowser/view/NAMA_10R_2GDP/default/table?lang=en , viewed on 01.12.2020

Eurostat (2020), *Households that have broadband access by NUTS 2 regions*. Retrieved from: https://ec.europa.eu/eurostat/databrowser/bookmark/e503e897-a0b1-4835-bcd4-1a9e25f2646b?lang=en, viewed on 12.12.2020

Eurostat (2020), *Households that have internet access at home by NUTS 2 regions*. Retrieved from: https://ec.europa.eu/eurostat/databrowser/bookmark/49a5dc8a-5f88-4783-9d93-632f11df8d8d?lang=en, viewed on 21.12.2020

Eurostat (2020), *Individuals regularly using the internet by NUTS 2 regions*. Retrieved from: https://ec.europa.eu/eurostat/databrowser/bookmark/79099f45-7ed4-479a-9c3b-dc8f0e76fe49?lang=en , viewed on 23.12.2020

Eurostat (2020), *Individuals who accessed the internet away from home or work*. Retrieved from: https://ec.europa.eu/eurostat/databrowser/bookmark/190eaa63-0db2-40fb-8b57-18ff015a6df4?lang=en viewed on 23.12.2020

Eurostat (2020), *Individuals who accessed the internet away from home or work*. Retrieved from: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=isoc_r_iumd_i&lang=en , viewed on 23.12.2020

Eurostat (2020), *Individuals who ordered goods or services over the internet for private use in the last year by NUTS 2 regions*. Retrieved from: https://ec.europa.eu/eurostat/databrowser/bookmark/ba4e5f6d-a214-48af-83fb-4c9b646c6588?lang=en, viewed on 23.12.2020

Eurostat (2020), *Individuals who used the internet for interaction with public authorities*. Retrieved from: https://ec.europa.eu/eurostat/databrowser/bookmark/ac88a397-a99a-4585-84e6-f383014e3b11?lang=en, viewed on 23.12.2020

Eurostat (2020), *Individuals who used the internet, frequency of use and activities*. Retrieved from: https://ec.europa.eu/eurostat/databrowser/bookmark/036950af-37d4-4c05-a1bb-c1553a236a08?lang=en, viewed on 23.12.2020

Eurostat (2020), *Population density*. Retrieved from: https://ec.europa.eu/eurostat/databrowser/view/tps00003/default/table?lang=en

Eurostat (2020), *Regional gross domestic product (PPS per inhabitant) by NUTS 2 regions*. Table: TGS00005. Retrieved from: https://ec.europa.eu/eurostat/databrowser/bookmark/0ba2f38c-59f9-4289-ba9c-55b8ea3e2187?lang=en, viewed on 13.01.2021

Eurostat (2020), *Regional gross domestic product (PPS per inhabitant in % of the EU27 (from 2020) average) by NUTS 2 regions*. Retrieved from: https://ec.europa.eu/eurostat/databrowser/bookmark/468fc037-be84-4ae9-9736-228ac99f8f04?lang=en , viewed on 12.12.2020

Eurostat (2020), *Unemployment rates by sex, age and NUTS 2 regions (%)*. Table: LFST_R_LFU3RT. Retrieved from: https://ec.europa.eu/eurostat/databrowser/bookmark/578ff1bb-650a-4fa7-88b2-32b31851a950?lang=en , viewed on 21.12.2020

Federal Ministry Republic of Austria, *Digital Austria*. Retrieved from: https://www.bmdw.gv.at/en/Topics/Digitalisation/Strategy/Digital-Austria.html; https://www.digitalaustria.gv.at/

Federal Ministry Republic of Austria, *For companies*. Retrieved from: https://www.bmdw.gv.at/en/Topics/Digitalisation/For-companies.html

Federico Dante De Falco (2020), *How Smart Specialization Strategies can impact the EU economy after the COVID-19,* August 2020, International Development Research Network, p. 1; Retrieved from: https://static1.squarespace.com/static/5e8ce9ff629cbb272fd0406f/t/5f2b1d7f204fb47312165a0c/1596661122119/How+Smart+Specialisation+Strategies+can+impact+the+EU+economy+after+Covid-19.pdf, viewed at 3.01.2021

FinanzOnline. Retrieved from: https://finanzonline.bmf.gv.at/fon

Government of Spain. Ministry of Industry, Commerce and Tourism, Industry 4.0. Retrieved from: https://www.industriaconectada40.gob.es/programas-apoyo/Paginas/programas.aspx

Granada Emprende (2020), *Why the New Technologies?* Retrieved from: http://www.granadaemprende.es/porque-las-nuevas-tecnologias-en-granada/

ILO, (2020), *ILO Monitor: COVID-19 and the world of work. 4th edition*. Retrieved from: https://www.ilo.org/global/topics/coronavirus/impacts-and-responses/WCMS_745963/lang--en/index.htm%E2%80%8B, viewed on 12.01.2021

IMF (2020), *Policy responses to COVID-19*. Retrieved from: https://www.imf.org/en/Topics/imf-and-covid19/Policy-Responses-to-COVID-19 , 04.11.2020

INE (2020), *Empresas por provincia y condición jurídica*. Retrieved from: https://www.ine.es/jaxiT3/Datos.htm?t=302#!tabs-tabla

Interreg Europe, *Glossary*. Retrieved from: http://www.interregeurope.eu/help/glossary/

Investment and Development Agency of Latvia (LIAA) (2020), *Business Infrastructure in Latvia*. Retrieved from: https://www.liaa.gov.lv/en/invest-latvia/business-guide/business-infrastructure-latvia

Investment and Development Agency of Latvia (LIAA) (2020), *Transport and Storage in Latvia*. Retrieved from: https://www.liaa.gov.lv/en/invest-latvia/key-sectors/transport-and-storage

Iotnow (2020), *COVID-19 has sped up digital transformation by 5.3 years R*etrieved from: https://www.iot-now.com/2020/07/23/104031-covid-19-has-sped-up-digital-transformation-by-5-3-years-says-study/ viewed on 13.11.2020

LR Ministru kabineta tiesību aktu projekti (2019), *Informatīvais ziņojums "Ceļvedis piektās paaudzes (5G) publisko mobilo elektronisko sakaru tīklu ieviešanai Latvijā"*. Retrieved from: http://tap.mk.gov.lv/lv/mk/tap/?pid=40471250

Ministry of Technological Innovation and Digital Transition (2020). Retrieved from: https://innovazione.gov.it/

Ministry of Technological Innovation and Digital Transition (2020), *National decree and strategy for digital skills*. Retrieved from: https://innovazione.gov.it/notizie/articoli/l-italia-ha-la-sua-strategia-nazionale-per-le-competenze-digitali/

Ministry of Economics of Republic of Latvia (2019), *Overlook of the Latvian Economic situation 2019*. Retrieved from: https://www.zemeunvalsts.lv/documents/view/35051070e572e47d2c26c241ab88307f/Latvijas%20ekonomisk%C4%81s%20att%C4%Abst%C4%Abbas%20p%C4%81rskats%202019.pdf

Ministry of Economics of Republic of Latvia (2020), *Economic situation*. Retrieved from: https://www.em.gov.lv/en/economic-situation-0

Ministry of Environmental Protection and Regional Development (2020), *Latvian Digital Transformation Guidelines for 2021-2027.* Retrieved from: https://www.varam.gov.lv/en/article/latvian-digital-transformation-guidelines-2021-2027-accellation-digital-capacities-future-society-and-economy

Nordea (2020), *Post COVID-19: What next for digital transformation?* Retrieved from: https://insights.nordea.com/en/business/post-covid-19-what-next-for-digital-transformation/ , viewed on 13.11.2020

Regione Basilicata, *Homepage*. Retrieved from: https://www.regione.basilicata.it/

Saliola, F., Islam, A. M. (2020), *How to Harness the Digital Transformation of the Covid Era.* Retrieved from: https://hbr.org/2020/09/how-to-harness-the-digital-transformation-of-the-covid-era, viewed on 12.01.2021

Smart Specialisation Platform (2020), *Involving regional stakeholders in the Smart Specialisation Strategy mid-term review*. Retrieved from: https://s3platform.jrc.ec.europa.eu/-/smart-story-andalucia-ris3-mid-term-evaluation?inheritRedirect=true

Smogorzewski, K.M., et al (2021 last upd), *Latvia, Economy, "Britannica Encyclopaedia"*. Retrieved from: https://www.britannica.com/place/Latvia/Economy#ref37308

Statistics Austria (2020), *Classifications of urban and rural areas.* Retrieved from: https://www.statistik.at/web_en/classifications/regional_breakdown/urban_rural/index.html

Statistics Norway (2020), *Area and population of urban settlements (C)*. Table 04860. Retrieved from: https://www.ssb.no/en/statbank/table/04860/tableViewLayout1/

Statistics Norway (2020), *Enterprises and employees (January 1), except public administration, agriculture, forestry and fishing, by industry (SIC2007), legal form and number of employees (C) 2008 – 2019*, Table: 07195. Retrieved from: https://www.ssb.no/en/statbank/table/07195/, viewed on 10.11.2020

Statistics Norway (2020), *Main results regional accounts (C) 2008 – 2018*. Table: 09391. Retrieved from: https://www.ssb.no/en/statbank/table/09391/, viewed on 10.11.2020

Statistics Norway (2020*), Population, by sex and one-year age groups (M) 1986 – 2021*. Table: 07459. Retrieved from: https://www.ssb.no/en/statbank/table/07459/, viewed on 10.11.2020

Statistics Norway (2020), *Regional accounts, by industry (C) 2008 – 2018*. Table: 11713. Retrieved from: https://www.ssb.no/en/statbank/table/11713/, viewed on 10.11.2020

Statistics Portugal, *Resident population (No.) by Place of residence (NUTS - 2013), Sex and Urban areas typology*. Retrieved from: http://www.ine.pt/xurl/ind/0008856

Statistics Portugal, *Resident population (No.) by Place of residence (NUTS - 2013), Sex and Age group (By life cycles)*. Retrieved from: http://www.ine.pt/xurl/ind/0008272

The Ministry of Economic Affairs and Digital Transformation, *2025 Digital Spain*. Retrieved from: https://portal.mineco.gob.es/en-us/ministerio/estrategias/Pages/00_Espana_Digital_2025.aspx

The Ministry of Economic Development of Italy, *Official web-portal*. Retrieved from: https://bandaultralarga.italia.it/mappa/?entity=17

United Nations Development Program, *Human Development Index (HDI) Ranking*. Retrieved from: http://hdr.undp.org/en/content/latest-human-development-index-ranking