

## EUROPEAN PUBLIC POLICIES IN THE AREA OF THE DIGITAL ECONOMY AND SOCIETY: COUNTRY PERFORMANCE ANALYSIS

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**Abstract:** The concept of the digital economy and society is quickly changing the reality of how citizens live and work. Originally anchored under the discipline of the information society, the new model of a digital technologies economy and society announces a shift from the knowledge-based to the data-based paradigm. This change was recognized in Europe in 2007, with the European Commission's Communication "E-skills for the 21<sup>st</sup> Century: Fostering Competitiveness, Growth and Jobs". In the following years, many European Union and national public policies and programmes were designed and introduced in Europe in order to keep abreast of the profound changes the model of digital economy and society brings into our world.

This paper analyses European public policies' and programmes' scope and objectives, evaluating their impact in terms of country-wide digital competitiveness over the period of 2014–2017. The paper provides insights at a European- as well as country-specific levels (via case studies) and covers the following areas: (1) scope and objectives of European public policies for the digital economy and society in Europe; (2) key actors involved in the public policies of the digital economy and society in Europe; (3) evaluation of the European public policies for the digital economy and society in Europe. Quantitative and qualitative research methods were employed for data collection and analysis: database research and analysis, statistical analysis, content and thematic research, and analysis from policy papers and reports.

The implementation of digital public policies in the EU from 2014–2017 led to an increase in the number of people with basic and advanced digital skills. However, the number of countries below the EU-28 average in 2017 in terms of human capital preparation for a digital society and economy was high. The digital public policies on the human capital dimension in the EU need to improve in national action and lead with urgency to a significant increase in the number of people with basic and advanced digital skills.

**UDC Classification:** 004.5; **DOI:** <http://dx.doi.org/10.12955/cbup.v6.1143>

**Keywords:** digital economy; digital society; information society

### Introduction

There have been many attempts thus far to define a digital economy and society. A possible definition is given by the Chartered Institute for IT in the UK: "The digital economy and society is based on digital technologies, including the integration of individuals into the online environment as well as the conduct of business through Internet-based markets" (BCS, 2016). Digital technologies have already penetrated all aspects of society and the economy, including how people communicate and interact, the skills needed to get a job, and the ways in which economic activities are carried out (WEF, 2018). The digital transformation of the economy and society has been driven by digitization and interconnection. Digitization is the conversion of analogue signals that transmit information (for example, sound, image, printed text) into binary code. In a digital context, information can be represented in a universal manner and can be stored as data. Unlike analogue information, digital data can be used (processed, stored, filtered, tracked, identified, duplicated, and transmitted) infinitely with digital devices, without degradation, at very high speeds and with negligible marginal costs. On the other hand, the Internet has made it possible to increase interconnections among individuals, organizations, and communities globally. In recent years, digitization and interconnection have benefited greatly from the exponential growth of computing power, the increased number of mobile and smart devices, and the presence of cloud computing.

As demonstrated by studies conducted by the Organisation for Economic Co-operation Development (OECD), "Over the past decade, a wide range of new products, applications and services have emerged, creating an ever-growing eco-system of technologies and applications that drive digital transformation through increased use by individuals, businesses and governments" (OECD, 2016). Many technologies underpin the current digital transformation, including the Internet of Things (IoT), big data analytics, artificial intelligence, blockchains, cloud computing, open-source software, robotics, virtual reality, and so on. Some of them have applications in almost all sectors of the economy and can be considered "of general use". Others have narrower applications in some sectors. Together, they form "an ecosystem of technologies that represent a wide and rapid digital transformation of the economy and society and increasingly governments in many areas, leading to market changes as well as economic and individual

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behaviour that are fundamentally different from the analogue world we are accustomed to" (OECD, 2017a).

For many EU citizens, the use of the Internet has become a common activity. According to studies conducted by Eurostat, 82% of the EU population was frequently use the Internet as of 2016, indicating that members were online at least once in the last 3 months prior to the 2016 survey (Eurostat, 2017). Nowadays, Internet users have many options as to how to go online, and often they use more than one device to do so. In 2016, mobile phones (smartphones) were the most commonly used Internet-access device, as reported by 79% of EU Internet users; in addition, 64% said they used a laptop, 54% used a desktop computer, and 44% used a tablet (Eurostat, 2017).

Digital transformation comes with a whole set of challenges in the economy and society, so it is necessary for many different policy areas to be considered simultaneously in an integrated approach. As stated in a ministerial report of the OECD Council of 2017, "The key actions to be taken to develop an integrated policy framework are to ensure that there is a foundation for digital transformation and that public policies in all fields allow for digital transformation in the economy and society" (OECD, 2017b).

The objective of the research undertaken in this paper is to identify public policies for the development of the digital society and economy in the EU, as well as to evaluate their impact in terms of countries' digital competitiveness over the period 2014–2017, especially from the perspective of human capital (basic and advanced digital competences).

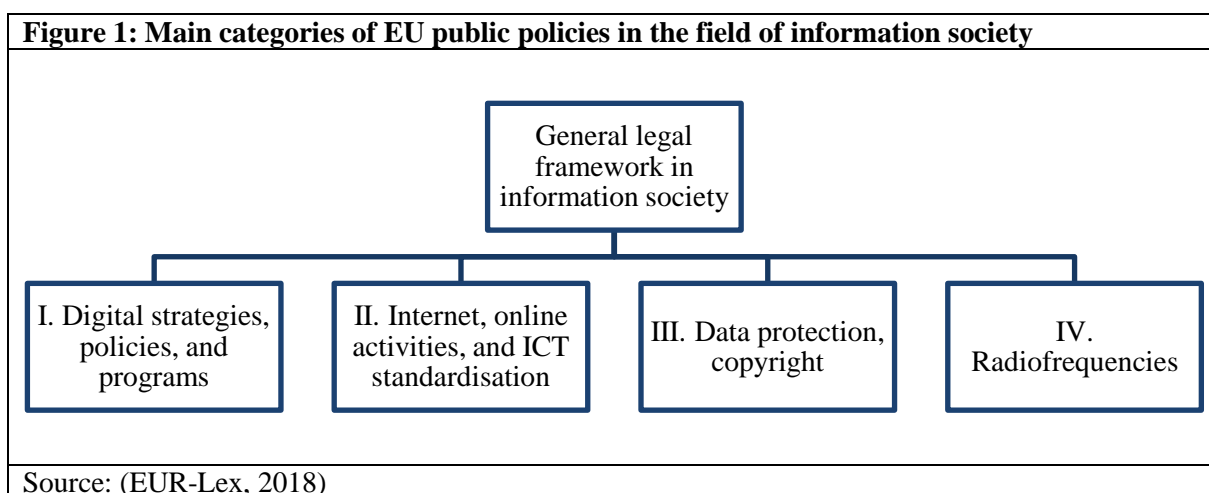
### Data and methodology

The research focused on two main issues: (1) What are the EU public policies in the field of digital society and economy? and (2) What is the impact of EU public policies on the digital society and economy?

The research used both qualitative and quantitative data-collection methods: the European Commission's research reports and the European Digital Progress Report (EC Open Datasets, EUR Lex); data and information from databases and platforms with EU public policies in the field of digital society and economy; data collected from platforms involving EU organizations active in implementing public policies in the field of digital society and economy; data from EU databases for the digital society and economy (Eurostat, DESI; Digital Agenda Tool).

### Scope and objectives of European public policies for the digital economy and society in Europe (review)

The area of digital economy and society is considered a part of the wider field of information and communication technology (ICT) in connection with information society (IS). Therefore, EU public policies and programs on the digital economy and society are included in the much broader public policies on ICT. Figure 1 presents current public policies and programmes, by domain, in ICT and IS.



In category I, "digital strategies, policies, and programs", one of the first public policies issued by the European Commission concerning the digital society was competence-related: Communication from the Commission from 7 September 2007, entitled "E-skills for the 21st Century: Stimulating Competitiveness, Growth and Jobs" (COM (2007) 496 final; EUR-Lex, 2007). In this communication,

the European Commission showed how it intends "to promote long-term actions for ICT. Indeed, [ICT] represent a major challenge for the European Union's competitiveness in a globalized world, and research and investment efforts prove to be essential" (EUR-Lex, 2007).

For 2007, the European Commission notes that:

- “E-skills are not recognized as a major political challenge”;
- “There is no complete strategy for digital skills in the EU, and regulations differ from country to country”; and
- “There is a gap between supply and demand for specific electronic skills, while digital illiteracy persists” (EUR-Lex, 2007).

The European Commission therefore insists on the need to “establish a long-term digital competences agenda. The implementation of these measures is the responsibility of the Member States, but they must bring real added value at European level” (EUR-Lex, 2007).

An overview of the EU public policies in the area of digital economy and society is presented in Table 1.

Year	EU public policy	Scope, objectives	Reference
2010	Communication from the Commission from 19 May 2010 “A Digital Agenda for Europe” (COM (2010) 245).	"The Digital Agenda presented by the European Commission is one of the seven pillars of the Europe 2020 Strategy, which sets the targets for the growth of the European Union (EU) by 2020. The Digital Agenda proposes to better exploit the potential of Information and Communication Technologies (ICT) to foster innovation, growth and progress" (EUR-Lex, 2010a). Actions deemed necessary by the EU include: 1. achieve a digital single market, 2. improve interoperability and standards, 3. strengthen online trust and security, 4. promote fast and ultra-fast access to the Internet for all, 5. invest in research and innovation, 6. improve digital skills and inclusion, and 7. promote intelligent use of technology for society.	(EUR-Lex, 2010a)
2010	Communication from the Commission “European Broadband: Investing in Digitally Driven Growth” (COM (2010) 472 final).	"The European Union (EU) broadband market is the largest in the world. Some EU Member States are leaders in the absorption rate. However, only 2-5% of broadband lines use Fibre-to-the-home or LAN, while this figure is 51.4% in Japan and 46% in Korea. As a consequence, EU networks need to be improved and updated. This communication proposes solutions to improve the current framework governing broadband and its integration into the Digital Agenda for Europe" (EUR-Lex, 2010c).	(EUR-Lex, 2010c)
2010	Commission Recommendation 2010/572/EU from 20 September, 2010. “Regulated Access to Next Generation Access Networks (NGA).”	"The Digital Agenda launched by the European Commission in May 2010 should allow each European to access fast broadband by 2013 and a very fast broadband by 2020. The regulation of access to next-generation access (NGA) networks is a crucial step. This recommendation therefore defines a common regulatory approach to accessing very fast fibre-optic networks in order to provide a balance between encouraging investment and maintaining competition” (EUR-Lex, 2010d).	(EUR-Lex, 2010d)

	Communication from the “The eGovernment Action Plan, 2011–2015: Using ICT to Promote Smart, Sustainable, and Innovative Governance” (COM (2010) 743).	"This action plan is part of the Digital Agenda 2020 and targets the exploitation of information and communication technologies (ICT) to enhance the efficiency and dynamism of European governments" (EUR-Lex, 2010d).	(EUR-Lex, 2010e)
<b>2013</b>	Directive 2013/37/EU of the European Parliament and of the Council on the Re-use of Public Sector Information. “Unlocking the Economic Potential of Public Data.”	"The reuse of data produced by the public sector has a vast economic potential. Meanwhile, the volume of these data increases. Improving the rules on when and how these data can be used and reused will therefore bring great benefits to the EU economy. This directive, part of Europe's Digital Agenda and its Europe 2020 growth strategy, aims to unlock this potential" (EUR-Lex, 2013a).	(EUR-Lex, 2013a)
<b>2013</b>	Recommendation no. 2013 of the Commission from 11 September, 2013. “Consistent Non-discrimination Obligations and Costing Methodologies to Promote Competition and Improve the Broadband Investment Environment (...).”	"The aim of this recommendation is to improve the regulatory conditions needed to promote effective competition and encourage investment in next-generation access networks (NGA)" (EUR-Lex, 2013b).	(EUR-Lex, 2013b)
<b>2014</b>	Communication from the Commission “Towards a Prosperous Data Economy” (COM (2014) 442 final).	"The Communication is a policy document with ideas on how EU countries can exploit the data for the benefit of their economies. The potential benefits of a data-based economy include improving citizens' welfare, new business opportunities and more innovative public services" (EUR-Lex, 2014).	(EUR-Lex, 2014)
<b>2015</b>	Communication from the Commission “A Strategy for the Single European Digital Single Market” (COM (2015) 192 final).	This communication sets out the strategy for a digital single market, one of the 10 European Commission's policy priorities and the agenda for employment, development, fairness, and democratic change. "A digital single market would enable consumers and businesses to take full advantage of the opportunities offered by the internet and digital technologies" (EUR-Lex, 2015).	(EUR-Lex, 2015)
<b>2017</b>	Communication from the Commission "Building a European Data Economy" (COM/2017/09 final).	“The communication focuses on free flow of data; access and transfer in relation to machine-generated data; liability and safety in the context of emerging technologies; and portability of non-personal data, interoperability, and standards” (EUR-Lex, 2017).	(EUR-Lex, 2017)
Source: Authors			

Through this legislation in the field of digital economy and society, the European Commission proposes a free dataflow initiative to promote the free movement of data in the EU; a European cloud initiative; priorities for standards and interoperability of critical digital devices, applications, data warehouses, services, and networks; and support for an inclusive digital society in which citizens have the necessary skills to take advantage of the opportunities of the Internet and increase their chances of getting a job.

### Key actors involved in EU public policies in the digital economy and society

The EU actors involved in the implementation of public policies in the digital society and economy are as follows.

### EU institutions

- European Parliament<sup>2</sup>. It is involved through its Industry, Research and Energy Committee, which issued 70 documents (opinions, reports, documents) in the field of the digital economy between 1 January 2014 and 1 March 2018.
- Council of the European Union<sup>3</sup>. It is involved through the Transport, Telecommunications and Energy Council. In the period of 1 January 2014–1 March 2018, it issued 218 documents (proposals for directives, communications) in the field of the digital economy and society.
- The European Commission<sup>4</sup>. It participates in the field of the digital society and economy through the General Directorate for Communications, Content and Technology (CONNECT<sup>5</sup>). This directorate-general of the European Commission is responsible for realising the digital single market in the EU, with the main objective of achieving smart, sustainable, and inclusive growth (in line with the Europe 2020 Strategy). DG CONNECT develops and implements EU public policies in the fields of digital economy and society, research and innovation, business and industry, and culture and media.
- European Economic and Social Committee<sup>6</sup>. This committee is active in a variety of public policies in areas including social issues, economic and monetary policies, energy, and sustainability. In its work on transport, energy, infrastructure, and information society, one of the digital agenda's priorities is the implementation of the digital single market strategy. The committee's views address essential aspects of the European digital single market—namely, digital security, digital education, the consequences of digitising the work environment, and the protection of users, especially children and people with disabilities. In the period of 1 January 2014–1 March 2018, the committee issued 45 official opinions on digital transformation and information society, as well as 6 studies and publications
- Committee of the Regions<sup>7</sup>. In the digital domain, the Committee of the Regions participates through the Commission for Social Policies, Education, Engagement, Research, and Culture (SEDEC). In the period of 1 January 2014–1 March 2018, the committee issued 14 reviews.
- European Data Protection Supervisor<sup>8</sup>. The supervisor is responsible for data protection legislation and maintaining the Data Protection Register.

### EU agencies

- European Network and Information Security Agency<sup>9</sup> (ENISA). The agency provides recommendations on cybersecurity and supports the development and implementation of public policies in the field.
- Innovation and Networks Executive Agency<sup>10</sup> (INEA). In the field of the digital economy and society, the agency is involved in the Connecting Europe Facility.
- Body of European Regulators for Electronic Communications<sup>11</sup> (BEREC). BEREC supports the European Commission and National Regulatory Authorities (NRAs) in implementing the EU regulatory framework for electronic communications.

### Other organizations

- The European Electronic Components and Systems for European Leadership<sup>12</sup> (ECSEL). The ECSEL platform is a public–private EU partnership that supports innovation in electronic components and systems.

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<sup>2</sup> <http://www.europarl.europa.eu/portal/en>

<sup>3</sup> [https://europa.eu/european-union/about-eu/institutions-bodies/council-eu\\_en](https://europa.eu/european-union/about-eu/institutions-bodies/council-eu_en)

<sup>4</sup> <https://ec.europa.eu/>

<sup>5</sup> [https://ec.europa.eu/info/departments/communications-networks-content-and-technology\\_en](https://ec.europa.eu/info/departments/communications-networks-content-and-technology_en)

<sup>6</sup> <https://www.eesc.europa.eu/en>

<sup>7</sup> <http://cor.europa.eu/en/Pages/home.aspx>

<sup>8</sup> [https://edps.europa.eu/edps-homepage\\_en](https://edps.europa.eu/edps-homepage_en)

<sup>9</sup> <https://www.enisa.europa.eu/>

<sup>10</sup> <https://ec.europa.eu/inea/>

<sup>11</sup> <http://berec.europa.eu/>

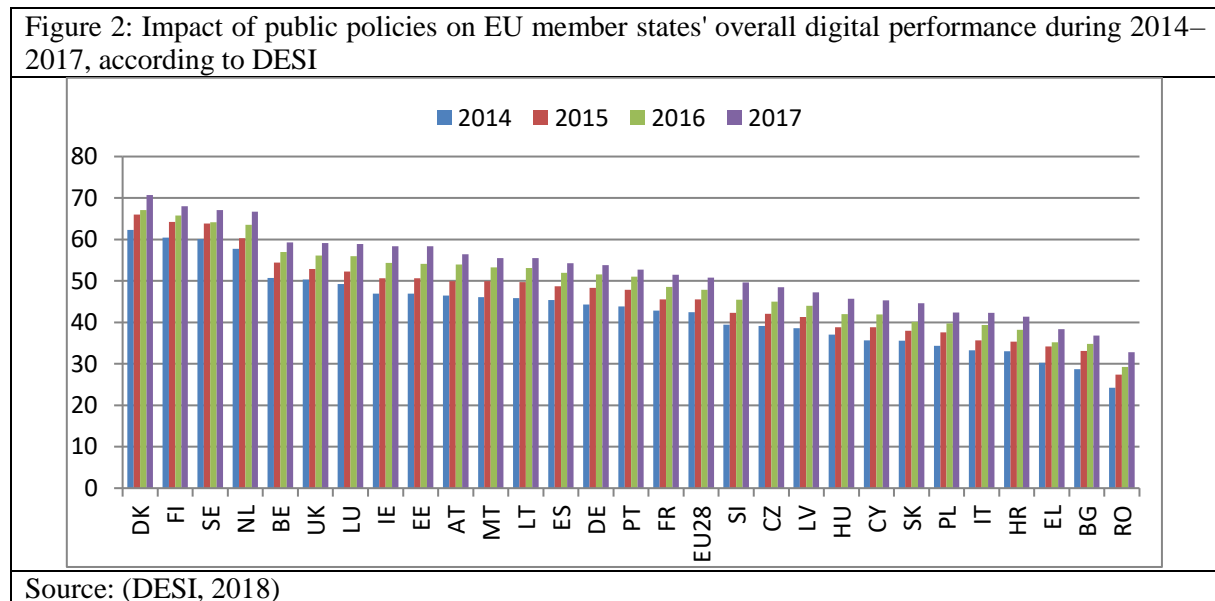
<sup>12</sup> <https://www.ecsel.eu/>

## Evaluation of European public policies for the digital economy and society in Europe, 2014–2017

The research carried out in this paper aims to evaluate the implementation of EU public policies in the field of the digital society and economy, following the performance indicators set by the European Commission in the Digital Economy and Society Index (DESI) for EU-28<sup>13</sup> (DESI, 2018). The European Commission launched the DESI in 2014 to monitor the progress of the digital society and economy among member countries. The DESI is structured over five dimensions, each of which includes several indicators (Box 1).

Box 1: The structure and the indicators in the Digital Economy and Society Index (DESI)
<p><b>Domain 1. Connectivity.</b> Indicators: fixed broadband; mobile broadband; speed; and broadband prices.</p> <p><b>Domain 2. Human Capital.</b> Indicators: basic skills and use of the Internet; advanced skills; and competence development.</p> <p><b>Domain 3. Using the Internet.</b> Indicators: use of online content by the population; communications; and online transactions.</p> <p><b>Domain 4. Integration of Digital Technologies.</b> Indicators: digitization of business and eCommerce.</p> <p><b>Domain 5. Digital public services.</b> Indicator: eGovernment.</p>
Source: (DESI, 2018)

The impact of public policies on the digital performance of EU member states during 2014–2017, considering all five dimensions of the DESI, shows that the top-performing countries are Denmark, Finland, Sweden, and the Netherlands (Figure 2).



The digital performance of the EU countries, presented in Figure 2, is, of course, the result of the combined implementation of national and European public policies. However, many of the national public policies have been achieved as a result of the EU's political priorities and overall agenda, so we can conclude that the analysis presented in Figure 2 is, to a great extent, an assessment of the implementation of EU public policies in the field of the digital society and economy.

In the period of 2014–2017, the implementation of EU public policies has led to the continued growth of digital competitiveness for all member countries, according to the DESI. The most pronounced increases in digital performance in 2017, as compared to 2014, were recorded for Ireland and Estonia (in both cases, increases in the DESI of 11.4% in 2017 compared to 2014), and Slovenia (an increase of

<sup>13</sup> [https://europa.eu/european-union/about-eu/countries\\_en](https://europa.eu/european-union/about-eu/countries_en)

10.22% in 2017 as compared to 2014). In these countries, the implementation of public policies in the digital sector had the greatest positive effect. Although they had the highest values for composite indicators, the digital index for Finland and Sweden did not increase significantly over 2014–2017. (Finland had a 7.53% increase in 2017 compared to 2014, and Sweden had a 7.01% increase.) Knowing the evolution of these two countries in the information society over the last decade, this data supports the observation that these countries had their own national ICT policies, which were already extremely well implemented in 2014, resulting in very high starting values for the digital index. These countries have continued their national public policies, with the added value of EU digital public policies, thus reaching the highest DESI values in the EU.

After four years of implementation of digital public policies in the EU, at the end of 2017, the most competitive digital countries were those in Western Europe, with DESI values above 60%. The least advanced digital countries in 2017, with less than 40% overall DESI values, were Romania, Bulgaria, and Greece (Figure 3).

Figure 3: Digital performance of EU member countries in 2017, according to DESI



Source: (DESI, 2018)

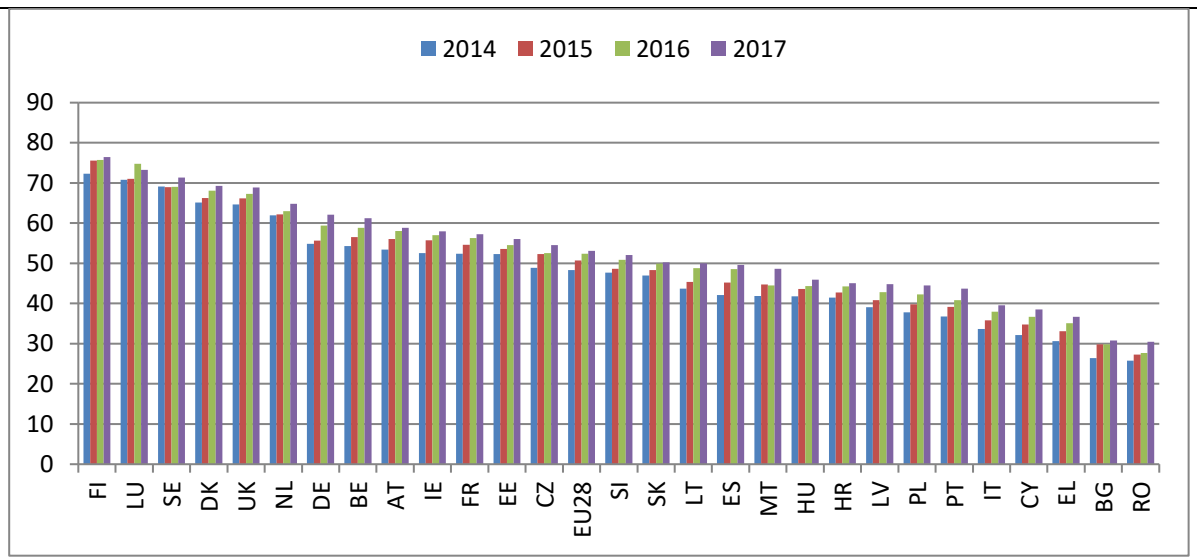
The second domain of the DESI is *human capital*, which includes two indicators: basic skills and use of the Internet, and advanced skills and competence development. Globally, considering the two indicators together, the human capital digital performance in the EU is highest for Finland, Luxembourg, Sweden, and Denmark, whereas the countries with the lowest values for the indicators are Romania, Bulgaria, and Greece (Figure 4).

Over the period of 2014–2017, for EU-28 there was a steady increase for the two digital indicators related to human capital of the DESI. Countries where human capital has advanced greatly over the 2014–2017 period (from the perspective of basic and advanced digital skills acquired by the population) are Spain and Germany. The lowest progress over the same period was recorded for Sweden, Luxembourg, and the Netherlands.

From the point of view of basic digital skills and the use of the Internet (basic skills and use of the Internet), in 2017, the most advanced EU countries are Luxembourg, Denmark, the Netherlands,

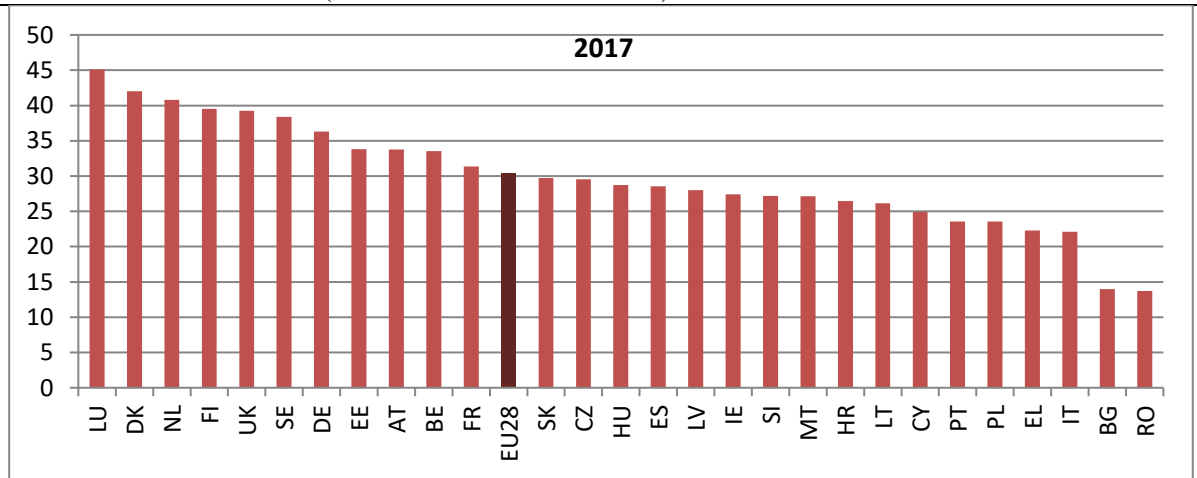
Finland, and the United Kingdom (Figure 4.8). The lowest values for basic digital skills were recorded in the same year for Romania, Bulgaria, Italy, and Greece (Figure 5).

Figure 4: Evolution of DESI: human capital indicators over the period 2014–2017 as a result of the implementation of digital public policies in the EU (%)



Source: (DESI, 2018)

Figure 5: The impact of digital public policies implementation over 2014–2017 on basic digital skills and the use of the Internet (% values indicated for 2017)



Source: (DESI, 2018)

With regard to advanced digital competences (advanced skills and competence development), the most advanced countries in 2017 were Finland, Great Britain, and Sweden, whereas Cyprus, Greece, and Latvia had the lowest values for this indicator (DESI, 2018).

**Conclusion**

The implementation of digital public policies in the EU from 2014–2017 led to an increase in the number of people with basic and advanced digital skills. However, the number of countries below the EU-28 average in 2017 in terms of human capital preparation for a digital society and economy was still high (18 countries, i.e., almost two-thirds of the EU were below the EU-28 average in 2017 for human capital). We can conclude that digital public policies on the human capital dimension in the EU need to improve in national action and lead with urgency to a significant increase in the number of people with basic and advanced digital skills.



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