

Copyright © 2021 The Author/s  
This work is licensed under a CC-BY 3.0 License  
Peer review method: Double-Blind  
Accepted: November 03, 2021  
Published: November 23, 2021  
Original scientific article  
DOI: <https://www.doi.org/10.47305/JLIA213711180>

# NEXT GENERATION EUROPEAN UNION AND THE DIGITAL TRANSFORMATION: AN OPPORTUNITY FOR SPAIN

**Marcin Roman Czubala Ostapiuk\***

National University of Distance Education, Spain  
ORCID iD: <https://orcid.org/0000-0002-0298-7609>  
[mczubala@cee.uned.es](mailto:mczubala@cee.uned.es)

**Miguel Ángel Benedicto Solsona**

Complutense University of Madrid, Spain  
ORCID iD: <https://orcid.org/0000-0002-9447-8288>  
[mibenedi@ucm.es](mailto:mibenedi@ucm.es)

---

**Abstract:** *The main objective of this article is to analyze the importance of digital transformation and the funds provided by way of the Next Generation EU (NGEU) plan, taking into account the Spanish case. Through the working hypothesis, it was established that the Iberian country has a wide margin for improvement in the context of digitalization. Likewise, that NGEU forms a key impulse for the recovery from the crisis caused by Covid-19, as well as for the implementation of new digital technologies in Spain. The use of the Digital Economy and Society Index, developed by the European Commission, has allowed us to carry out empirical research. The evaluation of the current situation and the progress of Spain in the field of analysis, as well as the putting it in perspective regarding the rest of the Member States, have been undertaken. Moreover, the Eurostat database has been employed, in addition to the estimations of the Spanish executive exposed through the Digital Agenda 2025, to examine investment in R&D and intangible assets and try to assess the importance of the EU recovery fund for Spain's development and progress in the digitization framework. Finally, the hypothesis and the objectives have been achieved.*

**Keywords:** *Digital Transformation; Next Generation; European Union; Spain; Covid-19*

---

## INTRODUCTION

The European recovery instrument forms a coordinated EU fiscal response to the negative effects caused by the deep crisis derived from the Covid-19 pandemic. Organized around two major keys, green and digital, together with the assets of the Multiannual Financial Framework 2021-2027, it aims to promote the relaunch of economic activity and employment in all the Member States of the Union, in addition to reinforcing confidence in the continuity of the European project. Equally, it constitutes an extraordinary effort, given the volume of mobilized resources, and reflects a change

in the paradigm of action that is far from the EU decisions taken in the face of the previous global financial and sovereign debt crisis that specifically affected the Eurozone (Chiodi 2020, 95).

Its implementation opens a long process of structural reforms and transformation, increasing the degree of fiscal responsibility and commitment to macroeconomic stability, seeking to improve the efficiency, equity, and sustainability of European economies, where Spain will foreseeably be one of the most benefited Member States (Bańkowski *et al.* 2021, 6-7). Linked to the increase in the EU's own resources ceiling and the issuance of common European debt, this first-order instrument includes two (mentioned above) specific areas of action. Likewise, the funds are distributed among the Member States according to the degree of need, particularly economic, political and social conditions, as well as recovery and resilience plans. Based on the review of the existing literature, the researches regarding the Next Generation EU plan (NGEU), its design, configuration, and financing are observed.

However, there is a considerable lack of analysis that addresses the EU recovery fund and the value of its digital transition aspect for the development of the particular Member States and their economies. Likewise, works that examine how it can help in the recovery of Spain after the Covid-19 pandemic. Therefore, there is a gap in the academic literature that is being addressed with the help of this research, reflecting the possibilities for Spain generated by the implementation of the NGEU, about digitization.

In this way, the general objective of the paper is to examine the importance of digital transformation and the funds provided through the Next Generation EU plan, taking into account the Spanish case. To this end, a series of specific objectives were also set up: a) to underline the importance of digitization and its potential to change the productive specialization of Member States; b) to highlight the capacity of other factors, specifically the Covid-19 crisis, to accelerate some of the technological trends; c) to indicate the situation and progress of Spain in the field of digitization; d) to study the digital policies of the recovery plan for the EU and the Spanish digital agenda; e) to estimate the possible impact that the NGEU will represent in terms of its digital transformation.

Furthermore, its development allowed to verify the main hypothesis: Spain has a wide margin for improvement in the context of digitization, being the Next Generation EU plan a notable boost for the recovery from the crisis caused by Covid-19, as well as for the implementation of new digital technologies in Spain.

## RESEARCH METHODOLOGY

In carrying out the work, the deductive research model was followed (Woiceshyn and Daellenbach 2018). Therefore, taking into account the enormous novelty of the selected topic, wanting to better understand its different aspects and sensitivities, knowing the insufficiency of the information contained in the analyzed literature, as well as seeking to promote the quality of the research proceeded and obtain the most complete conclusions, a mixed methodological design has been chosen (Denzin 1970), always from an interpretive paradigm.

Thus, the first phase of the study was characterized by a detailed analysis of the literature and other sources of information. Next, an interpretation has been made of the results of the Digital Economy and Society Index (DESI), developed by the European Commission, evaluating the current situation and the progress of Spain in the context of digitization, as well as putting it in perspective regarding the rest of the Member States. In addition, the Eurostat database has been used, in addition to the estimates of the Spanish executive presented through the Digital Agenda 2025, to examine investment in Research and Development (R&D) and intangible assets and try to assess the importance of the recovery plan for European funds in the Spanish digital context, ensuring the quality of the obtained conclusions.

## THEORETICAL BACKGROUND

Digitization is a powerful concept linked to the development of modern economies that takes its life through the conversion of current operations to digital format. That is the development and implementation of new ways of doing things, both in economic, social, and political processes, enabled by digital tools (Brynjolfsson and McAfee 2015).

Along, digital transformation (in the strict sense) constitutes an integral change in the functioning of an organization resulting from the implementation of digital technologies. From a broader point of view, it is a structural modification in the behavior of consumers, the functioning of companies and other actors (including the state), of the market, and, therefore, the global economy, through datafication (Śledziwska and Włoch 2020, 68). The definitions of this transformation can also be divided into three categories: technological, which emphasize its support in new digital technologies; the organizational ones, which emphasize the change of organizational processes or the creation of new business models; and finally, the social ones, which perceive it as a phenomenon that affects all areas of human life (Reis 2018).

In the same way, the changes that have been emerging in the economy, and under the influence of information and communications technology (ICT), required new conceptual proposals. The economy of knowledge (Machlup 1962) information, internet,

mobile or applications (OECD 2013, 5) has been forming since the 1960s. Nevertheless, the notion of the digital economy, perhaps the most current and which was especially interesting for the development of this research, is relatively recent. In the literature on the subject, depending on the study objectives, a multitude of definitions of this very ambiguous can be found, but at the same time important concept. Due to the nature and purpose of this work, and based on the subjective judgment of the authors, it is considered necessary to highlight some of its essential attributes.

Introduced in the mid-1990s by Don Tapscott, in his book 'The Digital Economy. Rethinking Promise and Peril in the Age of Networked Intelligence', the author defines it through the idea of the network intelligence era. A very ambiguous explanation, where the digital economy is understood as greater connectivity between human beings and intelligent machines through technology. Likewise, the proposal by Erik Brynjolfsson and Brian Kahin, developed in their book 'Understanding the Digital Economy: Data, Tools, and Research', where the authors define it as the last and, to a large extent, not carried out the transformation of all sectors of the economy thanks to computer digitization, it does not clarify much more (Brynjolfsson and Kahin 2000).

As for their first definitions from the Organization for Economic Cooperation and Development (2012) and the European Commission (2013), these international bodies linked the digital economy with the internet economy. However, it is the studies developed by the Economic and Social Research Council, about the impact of the digital economy on economic and social development and based on a review of the definitions identified in the literature on the subject, which allow estimating its main characteristics: it includes goods and services whose production and marketing process depends entirely on digital technologies; it forms a worldwide network of economic activities that are carried out through the use of ICT; it merges general-purpose technologies and different economic and social activities thanks to the use of the Internet and other related technologies; it operates with the help of digital technology, as well as is based on the hyperconnectivity of people, organizations and machines carried out through the Internet, mobile technologies and the Internet of things (Bukht and Heeks 2017, 1-26).

Therefore, it is to be observed that within the digital economy exceptional importance is given to intangible goods (Cañibano *et al.* 1999, 20-21), massive use of data is made, there is a popularity of platforms as a business model, in addition to the difficulties in evaluating which part of the production chain contributes to the final value of the produced goods.

In sum, and according to the report of the International Monetary Fund (2018): "The digitalization of the economic activity can be broadly defined as the incorporation of data and the Internet into production processes and products, new forms of household and government consumption, fixed capital formation, cross-border flows, and finance" (p. 6).

## CONTEXT

This growing phenomenon is changing all environments of human activity. At the same time, it raises concerns about its measurement and the possible undervaluation of economic activity linked to digital products. Although this does not specifically conform to the object of study of this research, it is worth indicating that the problems related to its estimation can be seen both with the conceptual limits of the Gross Domestic Product (GDP), the activity of the unregistered digital sector and with the prices of novelty digital products. Additionally, the questioning of the aforementioned GDP calculation methods is reinforced by the presence of low productivity growth in periods of accelerated technological change (Brynjolfsson 1993), while the best estimate of the importance of digitization of the economy could not only help to measure inflation, but also the evolution of the balance of payments and financial values and flows.

Digital transformation has also become a challenge for states and international organizations. National governments, through public policies, are responsible for providing a stable and accessible digital infrastructure for all those involved, this being a basic and essential condition for the proper functioning of the digital economy. In other words, an institutional and legal environment, which encourages innovation and the integration of digital technologies, as well as counts with an educational system capable of preparing society for such transformation and its effects.

The European Parliament (2015) has also underlined that the digital economy is increasingly intertwined with the material economy, making it difficult to differentiate. The ratio of activities in the services, manufacturing, and primary production sectors based on information and communication technologies has been increasing, turning the digital economy into the economy itself. Therefore, it seems clear that digitization, its development, and implementation can modify and influence the productive specialization of states and their economies, especially, its impact on the service sector and its configuration. Enabling its international commercialization, digitization forms a trend whose continuity seems assured thanks to the increasing global connectivity. Also, the use of data, its treatment as a product and service as such, open up many possibilities for improving the competitiveness of both business entities and different sectors as a whole (van Dijck 2014). Nor should be forgotten that worldwide changes in production processes are caused by different factors, not just digitization or automation. Beyond geopolitics and trade relations between great powers, commercial and technological tensions, the crisis caused by Covid-19 has formed an important impulse to accelerate certain technological trends in an unplanned way (Anderton *et al.* 2020, 8). It has not only exposed the weaknesses of the EU and its members but has also formed a lever for joint and coordinated actions, promoting measures that can have longer-term effects.

The most advanced countries, and the ones with the business structures characterized by higher ratios of digitization and robotization, were benefited, presenting better adaptation rates in the face of a slowdown in the global situation and external shocks. Therefore, it is to be expected that economic entities will promote investment in this area, whether in the medium or long term, with the advanced states being the main beneficiaries, both regarding their manufacturing sector (through reshoring processes) and the development of the branch of the services. That is to say, another reflection of the disparity in productive differentiation between developed and emerging countries, the effect of globalization, and the formation of production chains where new technologies will play an important factor in the specialization in question.

### *Spain: A Country with Room for Improvement in Digitalization*

Now, it is convenient to ask ourselves, what is the current situation and progress of Spain in the field of digitization? Estimating the digital scope of a country can be very sensitive, depending on the selected indicators. To do this, taking into account the object of study of this research and seeking to carry out an empirical exercise from an aggregate approach, the interpretation of the results of the European Commission's Digital Economy and Society Index (DESI) has been carried out, estimating the performance of our country in the analyzed context.

Combining the quantitative data from the five DESI indicators (connectivity, human capital, use of internet services, integration of digital technology, as well as digital public services), and as can be seen in Figure 1, Spain has been placed in the eleventh position of the DESI 2020 classification (EU-28), obtaining a score above the EU average (calculated based on data before the Covid-19 pandemic). Evidence of relatively rapid progress, corresponding to the 2015-2020 period, is one of the five Member States with the highest growth in this regard, however, still behind the Nordic countries, leaders in terms of digitization at the Community level.

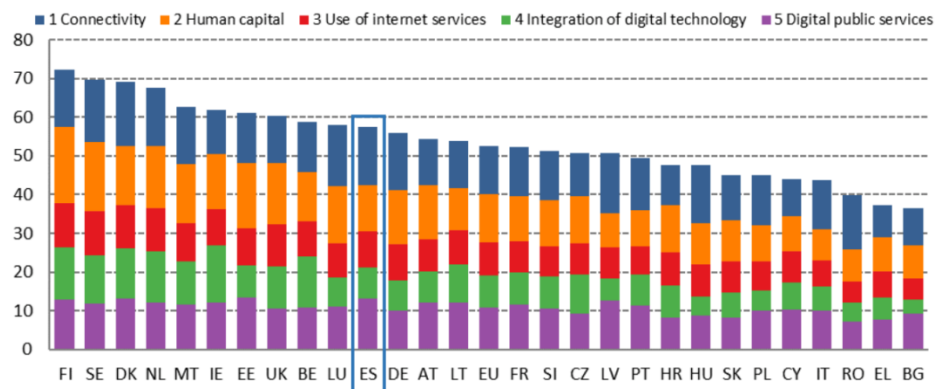


Figure 1: Digital Economy and Society Index 2020 (EU-28) (Source: European Commission 2021a)



As for the partial results, referring to the corresponding pillars of the synthetic indicator in question, it can be said that Spain stands out in two of them. First, digital public services, where it ranks second, having improved its figures since the previous year's ranking. Well above the EU average, and according to Figure 2, open data (90%), the participation of Spaniards in the authorities' digital services (82%), pre-filled forms (80%), the availability of e-government services for business (90%) or the completion of online services (96%) are areas where, once again, the high digital interaction between the public administration, citizens and companies is demonstrated.

	Spain		EU	
	DESI 2018	DESI 2019	DESI 2020	DESI 2020
	value	value	value	value
<b>5a1 e-Government users</b>	<b>67%</b>	<b>76%</b>	<b>82%</b>	<b>67%</b>
% internet users needing to submit forms	2017	2018	2019	2019
<b>5a2 Pre-filled forms</b>	<b>72</b>	<b>74</b>	<b>80</b>	<b>59</b>
Score (0 to 100)	2017	2018	2019	2019
<b>5a3 Online service completion</b>	<b>95</b>	<b>95</b>	<b>96</b>	<b>90</b>
Score (0 to 100)	2017	2018	2019	2019
<b>5a4 Digital public services for businesses</b>	<b>95</b>	<b>93</b>	<b>93</b>	<b>88</b>
Score (0 to 100) - including domestic and cross-border	2017	2018	2019	2019
<b>5a5 Open data</b>	<b>NA</b>	<b>NA</b>	<b>90%</b>	<b>66%</b>
% of maximum score			2019	2019

**Figure 2: The Governmental Administration's Digital Transition (EU-28)**  
(Source: European Commission 2021a)

Likewise, the digital transition of the Spanish central administration is an example to follow. The open data policy and the development of the appropriate computer architecture have made it possible to prepare the services provided for digitization (Government of Spain 2013). Nevertheless, interoperability with sub-national levels of public administration, to avoid possible overlaps in the provided services, remains a pending issue.

In the second place, connectivity, where Spain doubles the EU results, offering a very high-capacity network deployment (89%), despite occupying fifth place in the ranking. The distribution of fiber-optic networks (80%), although there are differences between urban and rural areas, is one of the main characteristics of our country, well above the Community average (34%). 4G coverage (95%) is almost on the same level as the EU average, while the implementation of 5G technology, a crucial technology for the development of the industrial 4.0 paradigm, is still a process in the making. In any case, the deployment of very high-capacity networks and ultra-fast broadband connections are the main qualities of our national environment. The clear demonstration of an ambitious national strategy, a legislative framework focused on supporting commercial investments, the activity of telecommunications operators, as well as a set of subsidies aimed at rural areas with the objective of their greater connectivity.

	DESI 2018	Spain	DESI 2020	EU
	value	value	value	value
<b>1a1 Overall fixed broadband take-up</b>	<b>73%</b>	<b>77%</b>	<b>78%</b>	<b>78%</b>
% households	2017	2018	2019	2019
<b>1a2 At least 100 Mbps fixed broadband take-up</b>	<b>18%</b>	<b>30%</b>	<b>53%</b>	<b>26%</b>
% households	2017	2018	2019	2019
<b>1b1 Fast broadband (NGA) coverage</b>	<b>85%</b>	<b>88%</b>	<b>90%</b>	<b>86%</b>
% households	2017	2018	2019	2019
<b>1b2 Fixed Very High Capacity Network (VHCN) coverage</b>	<b>71%</b>	<b>77%</b>	<b>89%</b>	<b>44%</b>
% households	2017	2018	2019	2019
<b>1c1 4G coverage</b>	<b>92%</b>	<b>94%</b>	<b>95%</b>	<b>96%</b>
% households (average of operators)	2017	2018	2019	2019
<b>1c2 Mobile broadband take-up</b>	<b>92</b>	<b>96</b>	<b>99</b>	<b>100</b>
Subscriptions per 100 people	2017	2018	2019	2019
<b>1c3 5G readiness</b>	<b>NA</b>	<b>30%</b>	<b>30%</b>	<b>21%</b>
Assigned spectrum as a % of total harmonised 5G spectrum	2019	2020	2020	2020
<b>1d1 Broadband price index</b>	<b>NA</b>	<b>NA</b>	<b>51</b>	<b>64</b>
Score (0 to 100)			2019	2019

Figure 3: Connectivity (EU-28) (Source: European Commission 2021a)

Also, the use of internet services presents results that are higher than the EU average. The use of the Internet, the reproduction of music, videos, and online games, as well as the participation in virtual courses, are the most highly valued activities. However, making video calls, reading the news on the Internet, or using social networks are not far from the joint European results either. On the other hand, the use of online banking (60%), making purchases (64%), and online sales (15%) suggests a certain reluctance of Spanish society in the face of the possible benefits of the mentioned services.

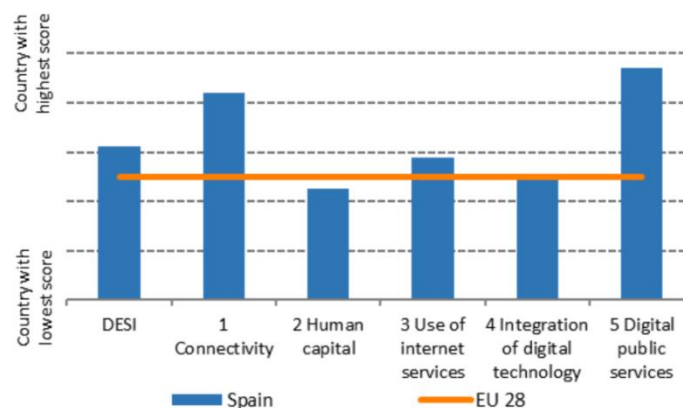


Figure 4: The Breakdown of DESI Digital Indicators 2020 (EU-28) (Source: European Commission 2021a)

On the other hand, if analyzing the digital indicators referring to human capital, it is to be observed that Spain is slightly below the EU as a whole, ranking 16th place. It is worrying that 43% of its population still lacks digital skills, at least at a basic level.



Regarding the percentage of specialists in information and communication technologies (3.2%), women ICT specialists (1.1%), and graduates of the sector (4.0%), although the results are not particularly encouraging, they are not far from the Community average. It is clear that to take full advantage of the opportunities of new technologies, Spain needs to have a sufficient number of properly qualified technicians. Without this, the capacity for innovation and the transition towards a digital economic environment will be slowed down, therefore, it is crucial to increase the number of specialists in the sector, also reducing the gender gap and promoting professional retraining, according to the Agenda Digital Spain 2025, aligned with the Sustainable Development Goals (SDG) and the Agenda 2030.

About the integration of digital technology, the classification of our country and the results obtained coincide with the EU average. Occupying the thirteenth place, Spain provides an environment of opportunities similar to the whole of the European Union. The electronic exchange of information characterizes 43% of Spanish economic entities. But, the analysis of big data (11%), the use of cloud services (16%) or social networks (29%), other qualities, are evidence of the growing gap with European leaders, and its extension during the 2015-2020 period.

As for small and medium-sized enterprises (SMEs), only 19% of them take advantage of the possibility of online sales. Meanwhile, the volume of their business from e-commerce (9%) or online cross-border sales to other EU countries (7%) are not very encouraging results either. The situation that, in general terms, is not observed in the case of large entities and requires special attention given the need to guarantee a solid and sustained economic recovery over time (Eurostat 2020a).

Finally, it must be remembered that not all sectors of the Spanish economy have the same degree of digitization. Thus, the technological development of the information and communication sectors, professional, scientific, and technical activities or tourist accommodation present results similar to those of their European counterparts. On the contrary, the agri-food industry or construction, traditionally, report wide margins for improvement. In conclusion, more efforts are needed in the analyzed field, promoting the digital capabilities of citizens and business entities, especially SMEs, seeking to lead the new 4.0 economy.

### *Next Generation EU and the Spanish Digitization Policies*

As mentioned before, the recovery plan for Europe contains two transversal axes, the green transition, and the digital transformation. The latter, the study object of this research. With the mobilization of the 750 billion euros (equivalent to 5.4 of the Community GDP) foreseen for the payment obligations contracted during the 2021-2023 period, the NGEU forms an unprecedented fiscal stimulus in the context of the European Union.

Throughout the process of its development, the European Commission stipulated the different areas that are considered crucial to promote the degree of digitization of the Member States: the quality of digital structures, enhance the training of the workforce in the digital context, the development and implementation of new technologies within SMEs, the greater distribution of business size and the incentive for the degree of digitization of public administrations in the countries. It forms a priority area of action for the Spanish executive to which it will assign 19,600 million euros (28% of total funds allocated, significantly above the minimum requirement of 20% for the common digital objective) (European Commission 2021b).

In its framework, coinciding with what was highlighted in the previous section, Spain presents weaknesses in access to qualified labor, an aspect that is especially important for our country given the results corresponding to human capital, below the EU average. Also, in the penetration of new technologies in the group of small and medium-sized companies, with a special emphasis on the reduced use of digital technologies on their part. Therefore, the digital transition is central given these especially neuralgic areas that require greater attention, as well as taking into account the weight of its solutions for the growth and modernization of the national productive system, or its configuration as a backbone of the territorial and social cohesion.

Similarly, it is important to highlight the different action plans, framed within the 2025 Digital Agenda, approved to promote the subject of digitization in Spain: the Digitization Plan and the National Plan for Digital Competences (which seek to improve the human capital and promote the technological digitization of the economy); the Connectivity Plan and the Strategy to Promote 5G (through their implementation it is intended to increase the deployment of high-speed broadband internet and the 5G network, providing hyperconnectivity in the national territory, as well as enabling other technologies); the Digitalization Plan for Public Administrations (aspiring to maintain and strengthen Spanish leadership in this scope, it aims to improve the accessibility of public services. Likewise, health or justice make up some of the target areas of its performance); the National Strategy of Artificial Intelligence (AI) (it proposes actions of its scientific development and innovation, in addition to the greater implantation of AI in our productive system, as one of the cutting-edge and most transcendental technologies in the new digital economy).

Through its implementation, the mobilization of 16,250 million euros in public investments is expected. Its 15,400 million will be financed through the recovery plan for Europe and its Recovery and Resilience Facility (RRF). In other words, around 20 billion euros in non-reimbursable transfers to the studied subject if the other smaller programs are added. Also, almost a third of the total funds are to be received from the RRF (69,500 million euros). An ambitious program that coincides with the areas identified by the Commission, but which, in addition to significant deployment of investments and the reach of critical mass by general utility technologies, requires an adaptation of the

legal framework. That is to say, the creation of a favorable and flexible environment for the different economic agents and facilitates their performance, specifically the production processes, in this novel context. Only in this way will it be possible to obtain the maximum growth potential, through the boost of productivity, which facilitates digitization and new technologies, permanently transforming our society and the economy. In practice, the funds provided will serve as a lever of change to face the accumulated fall in Community GDP, uplift private sector investment, modernize the economic system, promote the well-being of vulnerable groups and their training, as well as encourage the digitization of goods and services.

## DISCUSSION

After reviewing the situation and progress of Spain in the field of digitization, identifying the needs of our economy in the thematic area, as well as underlining the digital policies of the Next Generation EU and the Spanish digital agenda, it is essential to ask, where will the recovery plan for Europe put us in the digital race? Given that, in general terms, knowledge about the impact of digitization on the economy is limited, the Eurostat database has been used, in addition to the estimates of the Spanish executive exposed through the Digital Agenda 2025, to study the investment in R&D and intangible assets and try to assess the importance of the NGEU funds in the context of our country.

Let us remember that the measurement of the aforementioned assets, non-monetary and without physical substance is not simple either, its definition having been gradually expanded. In any case, they are comprised of digitized information (software and databases), ownership of innovation, or economic competencies (including human capital and the organizational structure of an economic entity) (Mas Ivars 2020, 47). Likewise, investing in them is the basis for the development and implementation of digital technologies, especially artificial intelligence.

However, according to Eurostat data, which can be seen in Figure 5, Community spending (EU-28) on innovation and development was just 2.14% (as a percentage of GDP in 2019), falling below the 3% target set in the Europe 2020 Strategy. In the same way, if Spanish investment is analyzed, it represented 1.25% of the national GDP in 2019, despite having recorded constant growth in previous years.

TIME	2013	2014	2015	2016	2017	2018	2019
<b>GEO (Labels)</b>							
European Union - 27 countries (from 2020)	2,1	2,11	2,13	2,12	2,15	2,18	2,2
European Union - 28 countries (2013-2020)	2,02	2,03	2,04	2,04	2,08	2,11	2,14
European Union - 27 countries (2007-2013)	:	:	:	:	:	:	:
Euro area - 19 countries (from 2015)	2,12	2,14	2,15	2,14	2,18	2,21	2,24
Belgium	2,33	2,37	2,43	2,52	2,67	2,67	2,89
Bulgaria	0,64	0,79	0,95	0,77	0,74	0,76	0,84
Czechia	1,88	1,96	1,92	1,67	1,77	1,9	1,94
Denmark	2,97	2,91	3,06	3,09	2,93	2,97	2,91
Germany (until 1990 former territory of the FRG)	2,84	2,88	2,93	2,94	3,05	3,12	3,18
Estonia	1,71	1,42	1,46	1,23	1,28	1,41	1,61
Ireland	1,57	1,52	1,18	1,17	1,22	1,14	0,78
Greece	0,82	0,84	0,97	1,01	1,15	1,21	1,27
Spain	1,28	1,24	1,22	1,19	1,21	1,24	1,25
France	2,24	2,23	2,27	2,22	2,2	2,2	2,19
Croatia	0,81	0,78	0,84	0,86	0,86	0,97	1,11
Italy	1,3	1,34	1,34	1,37	1,37	1,42	1,45
Cyprus	0,49	0,51	0,48	0,52	0,55	0,62	0,63
Latvia	0,61	0,69	0,62	0,44	0,51	0,64	0,64
Lithuania	0,95	1,03	1,04	0,84	0,9	0,94	1
Luxembourg	1,3	1,27	1,3	1,3	1,27	1,17	1,19
Hungary	1,39	1,35	1,34	1,18	1,32	1,51	1,48
Malta	0,74	0,69	0,72	0,56	0,56	0,6	0,59
Netherlands	2,16	2,17	2,15	2,15	2,18	2,14	2,16
Austria	2,95	3,08	3,05	3,12	3,06	3,14	3,19
Poland	0,88	0,94	1	0,96	1,03	1,21	1,32
Portugal	1,32	1,29	1,24	1,28	1,32	1,35	1,4
Romania	0,39	0,38	0,49	0,48	0,5	0,5	0,48
Slovenia	2,56	2,37	2,2	2,01	1,87	1,95	2,04
Slovakia	0,82	0,88	1,16	0,79	0,89	0,84	0,83
Finland	3,27	3,15	2,87	2,72	2,73	2,76	2,79
Sweden	3,26	3,1	3,22	3,25	3,36	3,32	3,4
United Kingdom	1,62	1,64	1,65	1,66	1,68	1,73	1,76
Turkey	0,81	0,86	0,88	0,94	0,95	1,03	1,06
Russia	1,03	1,07	1,1	:	1,11	0,98	1,03
United States	2,71	2,72	2,71	2,76	2,81	2,82	:
Japan	3,32	3,4	3,28	3,14	3,2	3,28	:

Figure 5: Gross Domestic Expenditure on R&D (2013-2019) (Source: Eurostat database)

If reviewed the investment in intangibles as such, the Spanish endowment was 6.5% (for 2017) placing behind the large economies, not only at the world level but also in Europe. The prevalence of the private over the public sector in its financing is another phenomenon that can be observed in the case of our country. Moreover, the growth of investment in intangibles over GDP in Spain, during the period between 1995 and 2017, was 0.11% per year. Slightly above other developed economies, probably given the enlargement margins existing in their framework in terms of digitization.

Regarding the possible impulse of NGEU in the digital transformation of Spain, taking into consideration its investment in intangibles, as indicated in the previous section, and the investment in digitization planned within the action plans for the 2021-2023period, it will count with 15.4 billion euros from the EU recovery fund. Nevertheless, for the correct calculation of the traction that it can provide on private investment in our country, it is necessary to eliminate the endowment of the Connectivity Plan, the 5G

Plan, and other investments in ICT equipment due to their investment nature in infrastructure, excluded of the endowment computation in intangibles. In total 4,700 million euros. Therefore, in short, we must speak of 10,700 million euros (to be implemented in three years), equivalent to 0.29% of annual GDP (Canals and Carreras 2021, 36).

Following the Digital Agenda 2025, the Spanish Government plans to attract 50,000 million euros in private investment. Excluding, again, the funds allocated to tangibles (within the Connectivity Plan and the 5G Plan), it is 26,000 million euros destined to investment in intangibles. That is an additional tractor effect equivalent to between 0.2% and 0.7% according to the calculations of the Spanish executive. If analyzed the estimates of the European Commission, the carryover result is even broader, between 0.6% and 0.8%. Therefore, adding both contributions, and taking the conservative scenario as a reference, it is between 0.5% and 1.0% of the direct impact of investment in intangibles on Spanish GDP.

Regarding the estimates of the impact of the NGEU funds on the gross domestic product, there is a great difficulty in its calculation. Resources derived from the pull effect are often not considered, due to the difficulty of classifying them according to the types of digital expenditure. In any case, the estimates of the short-term impact provided through the aforementioned entities, range between 0.3% and 0.6% for the States that are the largest beneficiaries of Community aid. In addition, its positive long-term effect is expected, highlighting its potential for digital transformation and economic recovery.

A truly remarkable result, which will make it possible to achieve significant financing of intangibles for the foreseen period, much more modest in the event of the absence of funds from the Next Generation EU or which would take much longer to achieve without the EU's help, modernizing the Spanish economy and increasing its potential growth.

## CONCLUSION

Digitization, in addition to being an element of territorial and social cohesion, can provide growth and modernization of the national productive structure, introducing important changes in different sectors of the economy. Likewise, the deep crisis derived from the Covid-19 pandemic has accelerated technological trends in the community context.

Studying the Spanish case, an important advance is observed in the provision of digital public services and the deployment of very high-capacity networks. On the contrary, there is still a wide margin for improvement regarding the global position of our country in terms of innovation and development. Likewise, in terms of digital skills and access to qualified labor, or the digitization of companies, especially SMEs, and their

productivity. Consequently, it can be considered that the digital transition will be a key aspect to attend to these especially neuralgic areas, as well as to strengthen Spanish recovery after the Covid-19 recession.

Regarding the EU recovery fund and its configuration, it constitutes an unprecedented community response. The digital transition, one of its main axes, allows an important boost for the development of states and their economies, making the NGEU even more important in the process of mentioned economic reconstruction.

However, the uncertainty regarding its impact is still high. Despite the many unknowns concerning the details of the financing programs or the potential scope of the implemented measures, it can clearly be said that the magnitude of its actions will be the effect of the impact of public investment projects on the general productive capacity of the economy. Moreover, that the Next Generation EU forms a powerful countercyclical policy and, well used, can bring about substantial changes and permanent benefits.

Finally, the carried-out research constitutes only part of a much broader and more complex scope. The enormous heterogeneity of the analyzed subject and its continuous evolution mean that the presented results shall not be perceived as definitive. In addition, the obtained conclusions, findings, and results should serve as the basis for future investigations to complete the presented vision. 🌐



## COMPLIANCE WITH ETHICAL STANDARDS

### Acknowledgments:

Not applicable.

### Funding:

Not applicable.

### Statement of human rights:

This article does not contain any studies with human participants performed by any of the authors.

### Statement on the welfare of animals:

This article does not contain any studies with animals performed by any of the authors.

### Informed consent:

Not applicable.

## REFERENCES

1. Alcidi, Cintia, and Gros, Daniel. "Next Generation EU: a large common response to the COVID-19 crisis." *Intereconomics* 55, n° 4 (2020): 202-203.
2. Anderton, Robert, Jarvis, Valerie, Labhard, Vincent, Morgan, Julian, Petroulakis, Filippas, and Vivia, Lara. "Virtually everywhere? Digitalization and the euro area and EU economies." *Occasional Paper Series*, n° 244 (2020): 1-137.
3. Arce, Óscar, Kataryniuk, Iván, Marín, Paloma, and Pérez, Javier J. "Reflexiones sobre el diseño de un Fondo de Recuperación Europeo." *Banco de España: Documentos ocasionales*, n° 2014 (2020): 1-25.
4. Bańkowski, Krzysztof, Ferdinandusse, Marien, Hauptmeier, Sebastian, Jacquinet, Pascal, and Valenta, Vilém. "The macroeconomic impact of the Next Generation EU instrument on the euro area." *European Central Bank: Occasional Paper Series*, n° 255 (2021): 1-23.
5. Brynjolfsson, Erik. "The Productivity Paradox of Information Technology: Review and Assessment." *Communications of ACM* 36, n° 12 (1993): 66-77.
6. Brynjolfsson, Erik, and Kahin, B. *Understanding the Digital Economy: Data, Tools, and Research*. Cambridge: MIT Press, 2000.
7. Brynjolfsson, Erik, and McAfee, Andrew P. "La digitalización de prácticamente todo." *Harvard Deusto Business Review*, n° 215 (2015): 18-27.
8. Bukht, Rumana, and Heeks, Richard. "Defining, Conceptualising and Measuring the Digital Economy." *GDI Development Informatics Working Papers*, n° 68 (2017): 1-24.
9. Canals, Claudia, and Carreras, Oriol. "NGEU: un impulso a la digitalización muy oportuno." *La Caixa Bank Research: Informe Mensual*, n° 454 (2021): 35-36.
10. Cañibano, Leandro, García-Ayuso Covarsí, Manuel, and Sánchez, M<sup>a</sup> Paloma. "La relevancia de los intangibles para la valoración y la gestión de empresas: revisión de la literatura." *Revista española de financiación y contabilidad*, n° 100 (1999): 17-88.
11. Chiodi, Francesco Maria. "Next Generation EU. Una oportunidad para una Europa más fuerte." *Revista Cultura Económica*, n° 100 (2020): 95-120.
12. Denzin, Norman. *Sociological Methods: a Source Book*. Chicago: Aldine, 1970.
13. European Commission. *Digital Economy and Society Index (DESI) 2020*. Brussels, 2021a.
14. European Commission. *Analysis of the recovery and resilience plan of Spain*. Brussels, 2021b.
15. European Commission. *Europe's Digital Decade: Commission sets the course towards a digitally empowered Europe by 2030*. Brussels, 2021c.
16. European Commission. *White Paper on Artificial Intelligence - A European approach to excellence and trust*. Brussels, 2020.

17. European Commission. *Expert Group on Taxation of the Digital Economy*. Brussels 2013.
18. European Commission. *Europe 2020. A strategy for smart, sustainable, and inclusive growth*. Brussels 2010.
19. European Parliament. *Challenges for Competition Policy in a Digitalised Economy*. Brussels, 2015.
20. Eurostat. Estadísticas sobre sociedad y economía digital. Bruselas, 2020a.
21. Eurostat. Estadísticas de inversión y desarrollo. Bruselas, 2020b.
22. Government of Spain. *España 2050 Fundamentos y propuestas para una Estrategia Nacional de Largo Plazo*. Madrid, 2021.
23. Government of Spain. *Agenda España Digital 2025*. Madrid, 2020.
24. Government of Spain. *Plan de Transformación Digital de la Administración General del Estado y Sus Organismos Públicos 2015-2020*. Madrid, 2013.
25. Hidalgo-Pérez, Manuel: "La Unión Europea ante la Cuarta Revolución Tecnológica" In *La unión hace la fuerza: Europa ante los desafíos del siglo XXI*, edited by Anchuelo Crego, Álvaro, Feas Costilla, Enrique, and Steinberg, Federico, 61-79. Barcelona: EdicionesDeusto, 2019.
26. International Monetary Fund. *Measuring the Digital Economy*. Washington DC: IMF, 2018.
27. Ladi, Stella, and Tsarouhas, Dimitris. "EU economic governance and Covid-19: policy learning and windows of opportunity." *Journal of European Integration* 42, nº 8 (2020): 1041-1056.
28. Machlup, Fritz. *The Production and Distribution of Knowledge in the United States*. Princeton: Princeton University Press, 1962.
29. Mas Ivars, Matilde. "El crecimiento de la productividad y los activos intangibles." *Papeles de economía española*, nº164 (2020): 41-59.
30. OECD, "The App Economy." *OECD Digital Economy Papers*, nº 230 (2013): 1-57.
31. OECD. *The Digital Economy*. Paris: OECD, 2012.
32. Reis, João. "Digital Transformation: A Literature Review and Guidelines for Future Research." In *Trends and Advances in Information Systems and Technologies*, edited by Rocha, Álvaro, Adeli, Hojjat, Reis, Luis Paulo, and Costanzo, Sandra, 411-421. Berlin: Springer, 2018.
33. Śledziwska, Katarzyna, and Włoch, Renata. *Gospodarkacyfrowa. Jak nowotechnologiezmienniająświat*. Warszawa: WUW, 2020.
34. Tapscott, Don. *The Digital Economy. Rethinking Promise and Peril in the Age of Networked Intelligence*. New York: McGraw-Hill, 1995.
35. van Dijck, José. "Datafication, dataism and dataveillance: Big Data between scientific paradigm and ideology." *Surveillance & Society* 12, nº 2 (2014): 197-208.

36. Woiceshyn, Jaana, and Daellenbach, Urs. "Evaluating inductive vs deductive research in management studies: Implications for authors, editors, and reviewers." *Qualitative Research in Organizations and Management: An International Journal* 13, n° 2 (2018): 183-195.