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IO1-A1.3 – National Need analysis Desk Research

Spain National Report

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Date: 12/07/2021

Erasmus+

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2020-1-IT02-KA201-079433| Co-funded by the Erasmus+ Programme of the European Union

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1. Introduction

Digital transformation is not a future utopia, but a steadily increasing reality. The outstanding development of digital technologies has been a worldwide process that Spain did not want to miss. Former Spanish governments have been already aware of the essential role digitalisation has to play for a more inclusive economic development[1]. With that goal in mind, several policy guidelines together with European efforts, have been carried out to make digitalisation a pillar of Spanish economic growth.

In the words of Emilio Ontiveros, professor of Business Economics in Universidad Autónoma de Madrid*, digitalisation is devoted not only to be a mere productive shift, but a truly new industrial revolution[2]. Since we are facing a holistic remodelling process, changes will not remain on economics: the way we communicate and consume are changing as well. Thus, our lifestyle and our relationships are being re-defined.

All evolution processes are supposed to experience slower and more dynamic periods of implementation. That aspect could have been also pointed out regarding digitalisation in Spain. As we will be describing later, some fields such as VHCN[3] connectivity services and internet use behaviour have been steadily growing for the last twenty years. However, digital transformation has been depicted, following the Sociedad Digital en España 2019 (SdiE 2019) report, edited by Telefónica Foundation, as being a main driver of a new "disruptive time". Confronted to a past lineal evolution process of technology services, this new disruption period was already intended to make enterprises undergo more rapid adaptations to a rather unpredictable domain. Yet COVID-19 pandemic crisis and its critical outcomes on our daily routine have triggered this process to an unexpected extent.

The COVID-19 critical conjunction has underpinned the already-existent challenges that the Spanish process of digitalisation had to face. Current Spanish Secretary State of digitisation and artificial intelligence has detected a rampant increase of Internet use services, naming this situation as "a super-connectivity extreme situation"[4], whose scope encompasses all public and private domains. Domains such as working skills, education and leisure have witnessed a greater dependency on digital services, leading to meaningful increments of "50% in land lines, 30% in mobile lines, 20% in network land line and 50% in mobile data network".

The severe economic and social consequences of the COVID-19 crisis outline many new setbacks and challenges that the Spanish national government will have to tackle. By now, the first

[1] Ministerio de Asuntos Económicos y Transformación Digital. 2021. "Agenda España digital 2025 report". (p.5). Access: https://www.lamoncloa.gob.es/presidente/actividades/Paginas/2020/230720-sanchezdigital.aspx

[2] Ontiveros, E.; López Sabater, V. 2017. "Economía de los Datos. Riqueza 4.0". Fundación Telefónica.

[3] Very High Capacity Network (VHCN)

[4] Ministerio de Asuntos Económicos y Transformación Digital. 2021. "Agenda España digital 2025 report". (p.6)

steps towards an innovative agenda have been established. Within the noteworthy financial support provided by the European Commission, the government has introduced the plan “España Puede”, in which the key principles that will lead the recovery will be intertwined with the mid-term national digitalisation plan: “the Agenda Digital 2025”. Those important plans will be addressed lately in this report.

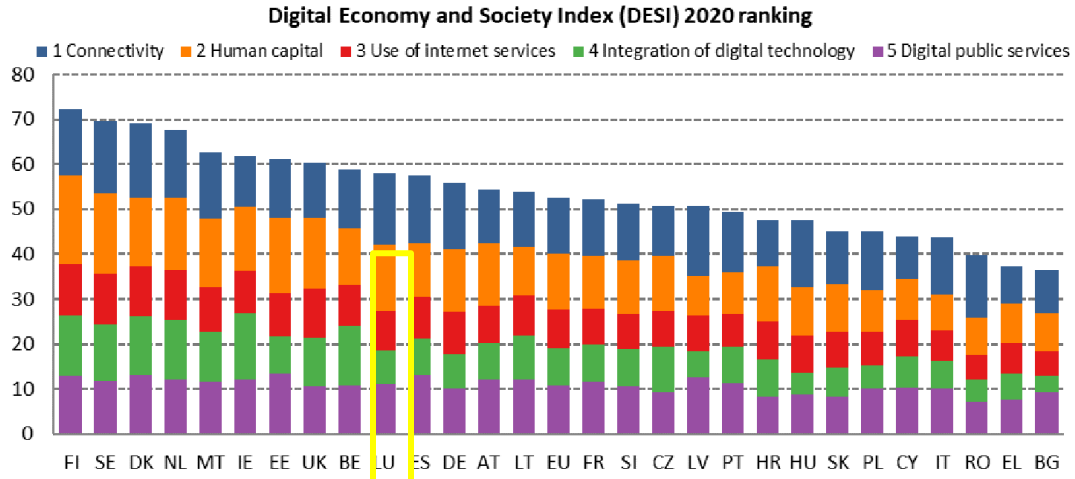
Notwithstanding this new scenario, some ground trends on the digitalisation process in Spain need to be identified. From now on, we will be firstly reviewing those broader characteristics, followed by a more accurate analysis of its status on the labour market and the education policy.

2. National desk research. The impact of digital transformation in Spain

2.1 Digital Economy and Society Index (DESI) 20205

DESI Index is aimed at calling the attention to the state of digitalisation from a broad perspective in economics and society. To report clear evidence on it, it combines quantitative data from Eurostat covering five dimensions and some key points of implemented policies. Those five dimensions (connectivity, human capital, use of internet services, integration of digital technology and digital public services) are given a score in order to build a ranking of the 27 EU member States.

According to its national report, Spain ranks out 11thout of 27 EU Member States and the UK.



As evidence shows, Spain proves a great special performance on two main fields: connectivity and digital public services. Those aspects have helped to improve Spanish relative position compared to its international partners.

Concerning to overall connectivity, Spain has promoted a vast digital infrastructure based not only on FTTP networks but also on fixed (VHCN). This area has been one standard of the previous digitalisation plans, rising Spain to the 5th place on the ranking. It has been the result of the phenomenal outcomes brough by an intense coalition between public and private agents.

All these strategies have been followed in the footsteps by the priorities that the new coalition government has set. A programme for the extension of next-generation broadband

[5] Statistics and data: European Comission. 2020. "Digital Economy and Society Indez (DESI) 2020. Spain national report". Access: https://ec.europa.eu/digital-single-market/en/scoreboard/spain

networks (*Programa de Extensión de la Banda Ancha de Nueva Generación*) will help financially to supply better networks to the remaining white and grey areas all over the country. Given the demographic distribution of Spain, which has been tending to concentrate most of the population in very few urban hubs, depressed areas will deserve specific attention to tackle growing inequities. Despite this challenge, the current diagnosis is still optimistic, since "rural FTTP coverage reaches 46% of households, significantly above the rates of both EU rural and total FTTP coverage (21% and 34% respectively)".

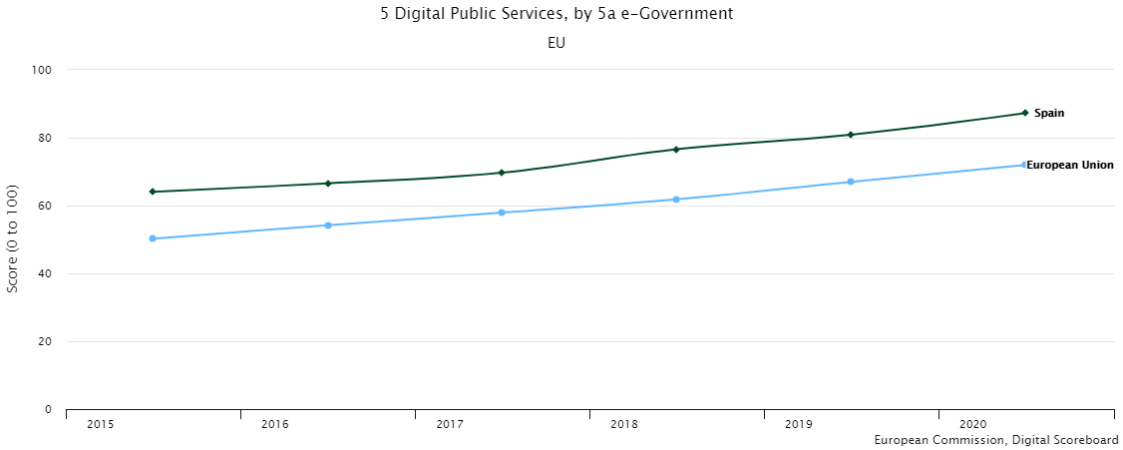


Figure 2. Source: European Comission (2019). National report 2020. Spain. Data from Eurostat.

Spain is also one of the top performers when it comes to digital public services, reaching the 2nd place in the ranking. Following this great performance, reports applaud the fantastic approach undertaken by Spanish institutions, and that has been based on the "digital-by-default strategy". This principle has been embedded directly to the heart of the legal instruments that shape the relationship between citizens and public administrations: Administrative Procedure Law (Ley 39/2015) and Public Sector Law (Ley 40/2015). It stands that a digital implementation strategy will be an effective and efficient way to improve the administration enforcement of citizen's rights. As part of the communitarian compromises taken on in this subject[6], improving the already existent basis is one of the main priorities of the new coalition government.

The digital-by-default principle is a strong stimulus towards a fully operative digital administration. It is based on the engagement of the public institutions to offer all their services by digital means as their first option, while keeping other channels available only for those who are not connected[7].

Statistics show the real terms of this successful policy. As DESI national report highlights:

[6]Council of the EU. 2017. "Tallin declaration on e-Government". Published the 6th October.

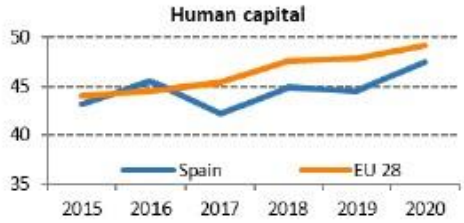
[7]Rodríguez Canfranc, P. 2020. "Una Administración digital para el siglo XXI". Seen on telos.fundaciontelefonica.com, 15th April. Access: https://telos.fundaciontelefonica.com/la-cofa/una-administracion-digital-para-el-siglo-xxi/

"82% of Spanish internet users actively engage with e-government services (…). Spain continued to improve its rating on pre-filled forms to reach 80 points, well above the EU average of 59. Spain also scored above the EU average on the availability of e-government services for business, with 93 points, ranking 11th. Lastly., Spain scored 96 points on online service completion, ranking 8th in the EU and 6 points above the EU average.

The country's investment in open government data is an example to follow for large EU economies when making the transition to digital-by-default in the central public administration[8]".

On the minus side, there are other fields in which Spain still has a meaningful effort to make. Especially regarding human capital training, its low accomplishment rates have a major footprint in some core pillars of the economic activity, such as SME's conversion to the digital market. Spain holds the 16th position on DESI index in this dimension, in spite of slight improvements from last years.

2 Human capital	Spain		EU
	rank	score	score
DESI 2020	16	47.6	49.3
DESI 2019	17	44.5	47.9
DESI 2018	17	44.9	47.6



The diagnosis of the DESI Index signals that "basic digital skill levels remain slightly below the EU average. 43% of people between 16 and 74 years of age lack basic digital skills (against the EU average of 42%)". Other reports, such as "Sociedad digital en España 2019 (SdiE 2019)"[9], draw attention to the dangers this weakness could bring up:

> "Societies where the digitalisation of daily activities is growing unstoppably, the lack of digital skills training may become a factor of social exclusion, as much as it is already the formal academic training".

Considering the high unemployment rates of Spain[10], more means must be put in place in order not to deepen the existent mismatch within the labour market. The lack of qualified workers on the digital domain is one of the main setbacks to push a further digital transformation of Spanish SME's, affecting 36% of them, as SdiE 2019 report shows[11]. This fact needs to be considered together with the high unemployment rates. Since 4 out of 10 people under 25 years old declare not to be able to find a job, despite the existing demand, educational policies are sought to be enhanced.

[8]European Commission. 2020. "Digital Economy and Society Indez (DESI) 2020. Spain national report".
[9]Fundación Telefónica. 2020. "Sociedad Digital en España 2019". Ed. Taurus. (p. 160)
[10]Data from INE. Available in: https://www.ine.es/infografias/tasasepa/desktop/tasas.html?t=0&lang=es
[11] Data referenced from 2018 IDG report State of Digital Business Transformation.

DESI report continues suggesting that "Spain needs a sufficient number of medium to high-skilled technicians to increase its innovation capacity and ensure a smooth transition to an increasingly digitised economic environment".

Other important field that deserves more attention will be the integration of digital technology. Spanish business familiarisation with digital technologies is in line with the EU average, ranking 13th among EU countries:

	Spain			EU
	DESI 2018 value	DESI 2019 value	DESI 2020 value	DESI 2020 value
4a1 Electronic information sharing % enterprises	46% 2017	46% 2017	43% 2019	34% 2019
4a2 Social media % enterprises	28% 2017	28% 2017	29% 2019	25% 2019
4a3 Big data % enterprises	8% 2016	11% 2018	11% 2018	12% 2018
4a4 Cloud % enterprises	18% 2017	16% 2018	16% 2018	18% 2018
4b1 SMEs selling online % SMEs	20% 2017	18% 2018	19% 2019	18% 2019
4b2 e-Commerce turnover % SME turnover	10% 2017	10% 2018	9% 2019	11% 2019
4b3 Selling online cross-border % SMEs	7% 2017	7% 2017	7% 2019	8% 2019

*Figure SEQ Figure * ARABIC 4. Source: European Comission (2019). National report 2020. Spain. Data from Eurostat*

In terms of e-commerce turnover, a government report on SME's digitalisation highlights a modest rise on this field, around 4-5%[12]. Nonetheless, this small improvement can be only retraced in enterprises being 10 to 49 employees sized. Yet the ones sized between 50 to 250 have shown a worse relative performance. Much more must be done to really take advantage of the phenomenal opportunities that digitalisation must supply.

Hence the strong commitment of Spanish government to boost these processes. The prior SME's report exposes some the main challenges the Spanish business sector is prone to face. What is supposed to be a turning point will be a better deployed coalition between public and private sector. By now, there are several strategic frameworks, arising from multiple administrative layers, aimed to foster this technological shift. Together with a Strategy Framework in SME's policies 2030 (Marco Estratégico en política de la PYME 2030), there are sectoral plans too, such as:

- Estrategia para la Digitalización del Sector Agroalimentario y Forestal y del Medio Rural*.
- Estrategia Nacional Industria Conectada 4.0*.
- Estrategia de Internacionalización de la Economía Española 2017-2027*.

[12]Gobierno de España. 2021. "Plan de digitalización de PYMEs. 2021-25". (p. 18). Access: https://www.lamoncloa.gob.es/serviciosdeprensa/notasprensa/asuntos-economicos/Paginas/2021/270121-digitalizaci-n.aspx

- Plan Estratégico de ICEX España exportación e inversions (ICEX)*.

Following the conclusions of the European Investment Bank report on its digitalisation index: "Digital firms have better management practices, are more innovative and productive, grow faster and create higher paying jobs"[13]. That is why Spanish institutions are willing to implement some strategic policies in fields such as Artificial Intelligence, cybersecurity, and cloud computing technology.

2.2 Recovering from COVID-19 crisis. "España Puede" and "Agenda Digital 2025"

The utterly shocking impact of the COVID-19 crisis has hit all aspects of our lives, in some unexpected ways. Not only it has not been the kind of cyclical economic crisis we are used to hear about. But also, it has unveiled some economic, social, and technological trends that will not ever go back to normal. Consequently, governments of the European Union have reacted to make this tough health crisis become a new opportunity. If new responses must be implemented, EU countries are working together to strengthen the basis for a new economic paradigm. That new scenario is aimed to underpin those responses. Within this process Spain has been one of the worst hit countries in the EU. Thus, it has also wanted to make the most of the valuable financial and political support the European institutions has built.

Spanish structural economic weaknesses have sharpened in the context of the COVID-19 pandemic. Alongside to the negative economic evolution all over the world, reports have shown an astonishing decline of Spanish GDP of around 11 points[14]. Some rather vulnerable sectors to closure threats (issued from mobility restrictions, customer's occupation…) have a noteworthy importance on Spanish economy, such as tourism or catering activities. There are some difficulties intertwined to these activities, and hence to the Spanish economic structure, that prevent a more thriving growth from happening.

Reports have widely pointed out the staggering unemployment rate undergone by Spanish society. As we argued before, it has been proved that it hits harder people aged between 18 to 25 years old, 40% of them being jobless. In addition, the temporary nature of the offered jobs and the dualities of the labour market give an idea of its precarious and unstable conditions[15].

[13]European Investment Bank. 2020. "Who is prepared for the new digital age? Evidence from the EIBInvestment Survey". (p. 10).

[14]Maqueda, A. 2021. "Spain's economy shrank 11% in 2020, biggest drop since Civil War". Seen on english.elpais.com, 15th April. Access: https://english.elpais.com/economy_and_business/2021-01-29/spains-economy-shrank-11-in-2020-in-biggest-drop-since-civil-war.html

[15]Gobierno de España. 2021. "Plan de recuperación, transformación y resiliencia". (p. 41). Access: https://www.lamoncloa.gob.es/presidente/actividades/Paginas/2020/espana-puede.aspx

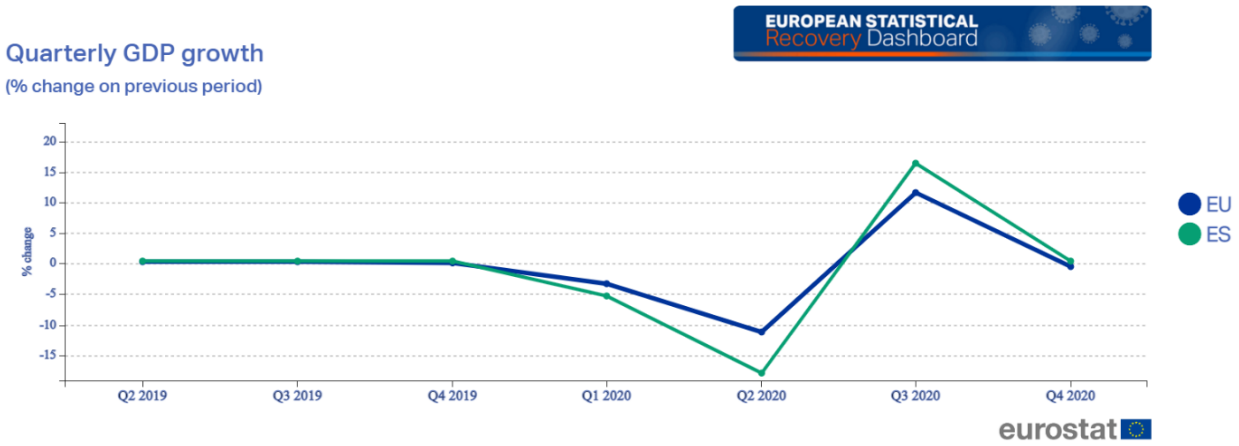


Figure 5. Source: Eurostat.

Nevertheless, pandemic has not had equal impact to all European citizens, but it has hit harder women jobs. The European trend was stated by the European Commission 2021 report on gender equality: "Preliminary data on labour market trends shows that the impact of the pandemic's first wave on the labour market was more significant for women than for men"[16]. At the same time, a study carried out by BBVA Research brought up matching data, applied to the Spanish example[17].

Given these well-known problems, and some newcomer ones, last 13th April the Spanish coalition government launched a more developed version of its recovery plan, so-called "España Puede"[18]. This document set the basis of the strategy the country is going to follow in order to earn the most from the new European budget instruments: the 2021-2027 long-term EU budget, as well as other assets such as the SURE facility to fund labour policies, or the REACT-EU, aimed to give a fast national response to the crisis.

Digitalisation will be a pillar of this recovery plan. "España Puede" plan reinforces the "Agenda Digital 2025" strategy. Altogether these two strategies will be the flagship of the digitalisation process in the upcoming years in Spain. Furthermore, there is still a third implementation layer encompassing some fields that the strategy has envisaged. There, the intellectual and funding resources will be more precisely allocated, while goals specified. Those concrete implementation plans will be approached when referring to the fields of our interest: business and education.

[16]European Commission. 2021. "2021 report on gender equality in the EU" (p. 21). Access: https://ec.europa.eu/info/sites/info/files/aid_development_cooperation_fundamental_rights/annual_report_ge_2021_en.pdf

[17]BBVA Research. 2020. "Diversidad de género y formación". Access: https://www.bbva.com/wp-content/uploads/2020/12/BBVA-Research-Diversidad-de-genero-y-formacion_Dic20.pdf

[18] Gobierno de España. 2021. "Plan de recuperación, transformación y resiliencia".

2.2.1. "España Puede". Recovery, transformation, and resilience plan

The publicly known as "Recovery, transformation and resilience plan" ("Plan de recuperación, transformación y resiliencia") contains an ensemble of 212 measures, being 110 of them investment plans, while the other 102 are strategical reforms. Aligned with the Next Generation EU recovery plan, it is devoted to undermining some of the prior structural economic difficulties, while addressing some of their social and environmental outcomes.

The plan is structured by 10 flagship policies, divided in several other components. The main key points are the following ones[19]:

I. Rural and urban agenda, fight against depopulation and agriculture development.

II. Resilient infrastructures and ecosystems.

III. Fair and inclusive energetic transition.

IV. A 21st century-adapted Administration.

V. Modernization and digitalisation of the SME's and industrial network, tourism recovery and boosting Spain as an entrepreneur nation.

VI. Innovation and Science agreement. Enhancement of the National Health System abilities.

VII. Education and knowledge, long-life learning, and ability development.

VIII. New Care Economy and employment policies.

IX. Impulse to the culture and sport industries.

X. Modernization of the tax system for a more sustainable and inclusive growth.

This recovery plan is intended to mobilise a remarkable volume of public resources: almost €70 billion are expected to be invested within the 2021-23 period. Furthermore, public administrations will not work alone in this process. Attracting private capitals is a government priority as well, both through direct collaborations and public-private partnerships. Different ways to achieve the goals of the plan have been designed. A *call for interest* procedure will be implemented, through which the different government departments will propose to private and public entities to co-operate envisaging a specific goal.

Moreover, new techniques of public-private collaboration have been already enacted. The so-called "Strategic Projects for recovering and economic transformation" (PERTE: "Proyectos Estratégicos para la Recuperación y Transformación Económica")* will be an innovative asset to optimize resources towards the most salient initiatives. In terms of public regulations, some steps forward have been already become true to push those projects. The 2020 Real Decreto-ley*

[19] Translated from: Gobierno de España. 2021. "Plan de recuperación, transformación y resiliencia". (p. 7).

36/2020, from 30th December[20] has passed urgent measures for modernization of Public Administrations, easing the "Recovery, transformation and resilience plan" implementation. PERTE projects are defined, by its article 8.1 as "the strategic projects especially able to boost economic growth, employment, and Spanish economic competitiveness". They will be only enforced once the Ministries Cabinet's has come to terms on the subject, while its implementation will remain accountable by independent agencies. Some of the highlighted criteria to name such relevant projects will be (art. 8.3):

a) Being economically relevant to boost economic growth, increasing the volume of employment and the Spanish industry performance (…).
b) Allowing knowledge, experiences, financial resources, and economic actors to go together to fix some market flaws (…).
c) Having an innovative nature (…).
d) Being a highly risky technological or economical challenge (…).
e) Enhancing integration and growth of the SME's (…).
f) Contributing specifically to the goals of the "Recovery, transformation and resilience plan" (…).

Some examples of investments that are already included in the "Recovery, transformation and resilience plan", regarding to digital transformation of Spanish economy are:

- € 3.9 billion to enhance digital connectivity, cyber-security and 5G deployment.
- €3.59 billion to implement a digital skills national plan.
- €1.64 billion to modernize and digitalize the education system.
- €500 million to implement an Artificial Intelligence national strategy.
- €200 million to Spain AVS Hub*.

2.2.2. "Agenda Digital 2025"

Framing more precisely the object of this report, the 2025 Digital Agenda set the key priorities for the Spanish government on the digitalisation transformation domain, within the "Recovery, transformation and resilience plan". Launched on 2020 July 23rd, it has been defined as the "tool for the technological and digital transformation in Spain. (…) It will be also a driver of the ecological transition towards a new economic and social mode, grounded on sustainability".

It is the result of the analysis process stemming from the DESI Index results that were pointed out before. Once the Spanish weaknesses of the digitalisation process have been detected, ten axes have been designed:

[20] Spain. Real Decreto-ley 36/2020, de 30 de diciembre, por el que se aprueban medidas urgentes para la modernización de la Administración Pública y para la ejecución del Plan de Recuperación, Transformación y Resiliencia. Access: https://www.boe.es/eli/es/rdl/2020/12/30/36/con

1. Digital connectivity.
2. 5G technologies impulse.
3. Digital skills.
4. Cyber-security.
5. Public sector's digital transformation.
6. Digital business transformation and digital entrepreneurship.
7. Drivers for sectoral digitalisation.
8. Spain, source of investment attraction and AV talent.
9. Data economy and artificial intelligence.
10. Digital rights.

Last 2021 January 23rdthe first action was announced by the Government. A combined investment of €11 billion for the following three years, through the implementation of three flagship plans: the Digital Skills national plan, 2021-25 SME's digitalisation plan and the Public Administration digitalisation plan.

2.3 The state of economic development: Businesses and digital technologies

Small and medium enterprises (SMEs)are reported to encompass approximately 99% of the Spanish business network, which proves its outstanding weight in the Spanish economy. Besides the structural challenges that this scenario could carry in terms of competitiveness, Spain holds the 13th position regarding technological integration of digital solutions in its businesses. Therefore, there is a clear goal to achieve: enhancing the participation of technological business in the Spanish economy in order to boost growth, internationalization, productivity and competitiveness.

The 2021-25 SME's digitalisation plan has been estimated to have a €4.66 billion until 2023. It will set the needed basis to foster the digital transformation process of more than 1.5 million small and medium enterprises, notwithstanding self-employed people and micro-enterprises.

The conceived targets have been set according to 5 key main action courses:

1. Impulse of basic digitalisation of the business sector.
2. Support to the management of change: CEO and staff training for digital business management.
3. Disruptive innovation and digital entrepreneurship, so that they entrepreneurs and start-ups can take most of the opportunities supplied by the green and digital economy.
4. Support to sector digitalisation: industry, trade, and tourism.

5. Remodelling of supporting assets and networks aimed to entrepreneurship, innovation, and digitalisation.

This strategy also offers economical locations to help self-employed workers, entrepreneurs, micro, small and medium enterprises connected to a vast variety of technological development dimensions.

2.4 Instructing citizens in a connected world: Education and digital technologies

Concerning the education domain, several targets have been already pointed out through these lines. The DESI nation report on human skills better clarifies what is the relationship like between Spanish society and the use of digital skills. The European Commission has also encouraged the member States to promote a more proficient use of digital technologies through diverse assets. One of the most salient ones has been the Digital Skills and Jobs Coalition. It drives private agents as well as public institutions, which must publicly endorse the Coalition's charter, to address the growing short-supplied demand of ICT professionals[21].

Later, the European Commission proposed a more concrete 2021-27 Digital Education action plan. It sets two strategic priorities[22], proposing some actions to undertake:

- Fostering a high-performing digital education ecosystem, grounded in an optimised digital equipment supply, digitally competent educators, and security.
- Enhancing digital skills and competences for the digital age, including digital literacy, management of information overload and disinformation.

On 2020 November 10th, the European Commission has introduced a new "Pact for Skills"[23]. In a few words: "it promotes joint action to maximise the impact of investing in improving existing skills and training in new skills". It calls all sort of stakeholders to get committed to invest in training for all EU working age people.

The European framing has been followed by the Spanish government in a specially concreted way. Altogether with the SME's and Public Administration Plans, a National Plan on Digital Skills has been introduced on 2021 February 10th. This strategy is rooted on the principles and

[21] European Commission. 2016. "The Digital Skills and Jobs Coalition Members Charter". Access: https://digital-strategy.ec.europa.eu/en/policies/digital-skills-coalition

[22] European Commission. 2020. "Digital Education Action Plan". Access: https://ec.europa.eu/education/education-in-the-eu/digital-education-action-plan_en

[23] European Commission. 2020. "The Pact for Skills: mobilising all partners to invest in skills". Access: https://ec.europa.eu/commission/presscorner/detail/en/ip_20_2059

challenges already identified. The conclusions drawn by the government can be summarized in the following key points[24]:

- Nobody must be left behind in their inclusion to the digital world, especially women and young women.
- Including digitalisation in the education and VET domain is fundamental.
- Advanced digital up-skilling and re-skilling applied to all production sectors.
- The volume of high-qualified ICT graduates must be enhanced.
- SME's need to implement a digital approach to their businesses.

The plan is also aimed to achieve an 80%of basic digital literacy all over the Spanish society. With this goal, 7 action courses and 16 measures have been designed, jointed through 4 budgetary axes:

1. Cross-comprehensive digital skills, estimated in €890 million.
   a. Digital training to all citizens.
   b. Battle against gender digital gap.
2. Digital transformation of the education, estimated in €1.637 billion.
   a. Developing of learning digital skills.
3. Digital skills for employment, estimated in €906 million.
   a. Digital Up-skilling and re-skilling for employed and unemployed people.
   b. Training in digital skills for public administration agents.
   c. SME's developing of digital skills.
4. Digital professionals, estimated in €160 million.
   a. Enhancing the number of ICT professionals.

All in all, the quoted budget will arise to €3.75 billion, 45.56% of it being devoted to Digital transformation of the Education. This essential milestone of the Spanish strategy on digital training is being already put into effect, seeking to fix some structural weaknesses. The Spanish digital skills national plan calls the attention, specially, to the following ones:

- 21% of students do not prove to have advanced digital skills.
- According to ITSE standards[25], Spanish students not only show low performance in mathematics and technology skills, but also in problem-solving, critical thinking and creativity.

[24] Gobierno de España. 2021. "Plan Nacional de Competencias Digitales". (p. 16). Access: https://www.mptfp.gob.es/va/portal/funcionpublica/secretaria-general-de-funcion-publica/Actualidad/2021/02/2021-02-10_01.html

- Technological changes being faster than programme adaptations to them.

Within this scenario, a plan aimed to digitalisation and digital skills in the educative system will encompass a set of actions to endorse the digital transformation of the education sector. Some months before, decisions were undertaken. On 2020 6th June, the Spanish government launched "Educa en Digital" programme[26]. During the current 2020-21 school year, €260 million have been being devoted to furnishing digital devices and connectivity to schools. Through a borrow-lend system, around 500,000 devices will be distributed to the students, so that they can overcome the digital gap despite economic difficulties. Furthermore, the programme seeks to set up an assistance programme facility through Artificial Intelligence technology that will bring together students, teachers and concerned authorities.

Statistics have been alerting of the existent digital gap in the heart of Spanish society. The 2019 survey regarding "Equipment and Use of Information and Communication Technologies"[27] from INE concluded that almost 800,000 families did not have electronic devices at home. Matching results have been shown by PISA reports and other statistics stemming from Spanish government[28].

Moreover, the Vocational Education Training (VET) was already a priority of the Spanish government, even before the National Plan on Digital Skills was enacted. On 2019 November 22nd, the Minister Cabinet passed the "Plan Estratégico de Formación Profesional del Sistema Educativo 2019-2022" *. What is more remarkable regarding digitalisation is its efforts on updating the qualifications requirements demanded by the labour market. Around 80 new certificates and specialization connected to digitalisation will be implemented, such as intelligent production processes, maintenance digitalisation, cybersecurity, 5G setting up or big data analysis. These measures arose from the detected scarcity of intermediate professionals, who can perform better on the jobs provided by the labour market.

[25]Data from: International Society for Technology in Education. In Gobierno de España. 2021. "Plan Nacional de Competencias Digitales". (p. 29).

[26]Gobierno de España. 2020. "El Gobierno lanza el programa Educa en Digital para impulsar la transformación tecnológica de la Educación en España". Seen on: educacionyfp.gob.es. Access: http://www.educacionyfp.gob.es/prensa/actualidad/2020/06/20200616-educaendigital.html

[27]Gobierno de España. 2020. "El Gobierno lanza el programa Educa en Digital para impulsar la transformación tecnológica de la Educación en España". Seen on: educacionyfp.gob.es.

[28] Data from: 2018 PISA report. In Gobierno de España. 2020. "El Gobierno lanza el programa Educa en Digital para impulsar la transformación tecnológica de la Educación en España". Seen on: educacionyfp.gob.es.

2.5 Sources

BBVA Research. 2020. "Diversidad de género y formación". Access: https://www.bbva.com/wp-content/uploads/2020/12/BBVA-Research-Diversidad-de-genero-y-formacion_Dic20.pdf

Council of the EU. 2017. "Tallin declaration on e-Government". Published the 6th October.

Rodríguez Canfranc, P. 2020. "Una Administración digital para el siglo XXI". Seen on telos.fundaciontelefonica.com, 15th April. Access: https://telos.fundaciontelefonica.com/la-cofa/una-administracion-digital-para-el-siglo-xxi/

European Commission. 2021. "2021 report on gender equality in the EU" . Access:

https://ec.europa.eu/info/sites/info/files/aid_development_cooperation_fundamental_rights/annual_report_ge_2021_en.pdf

European Commission. 2020. "Digital Economy and Society Index (DESI) 2020. Spain national report". Access: https://ec.europa.eu/digital-single-market/en/scoreboard/spain

European Commission. 2020. "The Pact for Skills: mobilising all partners to invest in skills". Access: https://ec.europa.eu/commission/presscorner/detail/en/ip_20_2059

European Commission. 2020. "Digital Education Action Plan". Access: https://ec.europa.eu/education/education-in-the-eu/digital-education-action-plan_en

European Commission. 2016. "The Digital Skills and Jobs Coalition Members Charter". Access: https://digital-strategy.ec.europa.eu/en/policies/digital-skills-coalition

European Investment Bank. 2020. "Who is prepared for the new digital age? Evidence from the EIBInvestment Survey".

Fundación Telefónica. 2020. "Sociedad Digital en España 2019". Ed. Taurus

Gobierno de España. 2021. "Plan Nacional de Competencias Digitales". (p. 16). Access: https://www.mptfp.gob.es/va/portal/funcionpublica/secretaria-general-de-funcion-publica/Actualidad/2021/02/2021-02-10_01.html

Gobierno de España. 2021. "Plan de recuperación, transformación y resiliencia". Access: https://www.lamoncloa.gob.es/presidente/actividades/Paginas/2020/espana-puede.aspx

Gobierno de España. 2020. "El Gobierno lanza el programa Educa en Digital para impulsar la transformación tecnológica de la Educación en España". Seen on: educacionyfp.gob.es. Access:

http://www.educacionyfp.gob.es/prensa/actualidad/2020/06/20200616-educaendigital.html

Maqueda, A. 2021. "Spain's economy shrank 11% in 2020, biggest drop since Civil War". Seen on english.elpais.com, 15th April. Access: https://english.elpais.com/economy_and_business/2021-01-29/spains-economy-shrank-11-in-2020-in-biggest-drop-since-civil-war.html

Ministerio de Asuntos Económicos y Transformación Digital. 2021. “Agenda España digital 2025 report”. (p.5). Access: https://www.lamoncloa.gob.es/presidente/actividades/Paginas/2020/230720-sanchezdigital.aspx

Spain. Real Decreto-ley 36/2020, de 30 de diciembre, por el que se aprueban medidas urgentes para la modernización de la Administración Pública y para la ejecución del Plan de Recuperación, Transformación y Resiliencia. Access: https://www.boe.es/eli/es/rdl/2020/12/30/36/con

Ontiveros, E.; López Sabater, V. 2017. “Economía de los Datos. Riqueza 4.0”. Fundación Telefónica.

Statistical information stemming from:

- INE*.

- Eurostat.

3. Description of national research

3.1 New trends and opportunities in the Spanish digitalisation process

Having captured the structural trends that will define the future of the Spanish economy and society, much more could be said about the outcomes of digitalisation regarding individuals' prospects. This is not a new path to discover. The World Economic Forum launched on 2020 January a document tackling a salient issue of everyone's life, "Jobs of Tomorrow. Mapping opportunity in the new economy". Conclusions can be drawn from it:

> "The roles with the highest rate of growth within high-volume jobs include Artificial Intelligence Specialists, Medical Transcriptionists, Data Scientists, Customer Success Specialists and Full Stack Engineers. Within lower-volume jobs, the highest growth is in Landfill Biogas Generation System Technicians, Social Media Assistants, Wind Turbine Service Technicians, Green Marketers and Growth Hackers".[29]

Figure 1: Emergence of clusters of professions of the future, 2020-2022

	Number of opportunities (per 10,000)	
Professional Cluster	**2020**	**2022**
figures extrapolated from data for 20 economies (LinkedIn)		
Data and AI	78	123
Engineering and Cloud Computing	60	91
People and Culture	47	58
Product Development	32	44
Sales, Marketing and Content	87	125
figures extrapolated from data for the United States (Burning Glass)		
Care Economy	193	260
Green Economy	9	14
ALL CLUSTERS	**506**	**715**

Note
Number of opportunities refers to the number of new opportunities for every 10,000 opportunities in the labour market and is calculated as a compound average annual growth rate.

Sources
LinkedIn and Burning Glass Technologies.

Digitalisation is transforming economies and the national labour markets; hence people's opportunities and desires are changing at the same time. Nevertheless, "The Future of Jobs Report" also points out that this time the labour market is changing faster than individuals' perspectives, thus a rising demand of innovative jobs might remain short-supplied[30]. Consequently, the already-existent mismatch between the labour market's supply-demand within countries such as Spain might even exacerbate. Putting alongside these conclusions with the

[29] World Economic Forum (WEP). 2020. "Jobs of tomorrow. Mapping opportunity in the new economy".
[30] World Economic Forum (WEP). 2020. "Jobs of tomorrow. Mapping opportunity in the new economy". (p.18).

results brought up by the DESI on Spanish digital skills proves the extent to which immediate action is needed.

Yet not only the developed tasks will change thanks to digitalisation, but also the way they will develop. Despite this shift was steadily spreading in Spain, COVID-19 pandemic crisis has driven many enterprises to adapt to the reality of teleworking. This new mode of interaction between organizations and workers has transformed business action courses, as well as people lifestyles. The wider flexibility that teleworking enhances is seen by many experts as a great opportunity for both enterprises and workers, also in Spain[31].

Teleworking supplies a more efficient form of valuating productivity. From the traditional hour-measuring system, teleworking allows an achievement-based one. Furthermore, salaries could be more determined by those reached goals, pushing workers to build a more balanced lifestyle between their work, family, and leisure, more accordingly to their needs. On the contrary, some risks have been also unveiled. Besides some planning difficulties, the main challenges will be faced by workers. Especially, in terms of the clash between the worker's right to disconnect and the enterprise's surveillance faculties[32]. Indeed, it has been reported that the imperative teleworking arisen from the COVID-19 crisis has driven 12% of the polled employees to work longer daily.

However, the most reticent actor in Spain towards teleworking are still the enterprises by now. A 2020 research study conducted by Randstad company for Spain[33] argues that around 68.6% of Spanish employees were already willing to telework in 2019, although their enterprises did not allow it. This situation is believed to have changed since the COVID-19 crisis broke out. Yet it proves the rooted cultural dependency on the direct control that enterprises manifest. Teleworking is also more prone to be adopted by young employees rather than older ones, as well as by scientific and intellectual professionals than any other kind.

Digitalisation outcomes have also deeply impacted over the education methodology prospects. Forced by the pandemic, all Spanish schools, high schools, and universities had to switch their lessons from an in-person system to an online one. Reactions within the education

[31] Melle Hernández, M. 2020. "Una oportunidad para la digitalización del teletrabajo". Agenda Pública. Access in: https://agendapublica.es/una-oportunidad-para-la-digitalizacion-y-el-teletrabajo/

[32] Molina, O., Godino, A., Molina, A. 2020. "¿Sin derecho a desconectar? El control del teletrabajo en tiempos de COVID-19. Access in: https://agendapublica.es/sin-derecho-a-desconectar-el-control-del-teletrabajo-en-tiempos-de-covid-19/

[33] Randstad. 2020. "Solo el 22,3% de la población ocupada puede teletrabajar en nuestro país". Access: https://www.randstad.es/nosotros/sala-prensa/solo-el-223-de-la-poblacion-ocupada-puede-teletrabajar-en-nuestro-pais/

community have been sometimes divergent[34] between those who could quickly adapt to the new context and those who encountered serious problems. However, it is widely agreed that digital technologies are going to be basic in their learning process.

Therefore, public and private actors have considerably enhanced their commitment to improve the students' performance on the digital skills domain. Aligned with the public initiatives that were previously outlined, there are many private initiatives as well. Furthermore, new pedagogical approaches, more compatible with the opportunities supplied by digitalisation are being supported. The STEAM method is one of the most salient ones[35]. The acronym of *Science, Technology, Engineering, Arts and Maths* is aimed to show students how to deal with a more dynamic and unforeseeable learning environment, regardless of whether their job will be a technical one or not. In short, it is focused on improve the student abilities to find solutions to real problems, using the tools they have available find. Digital skills will be an essential asset for them.

A good example of Spanish private initiatives in the education domain can be the "Academia de inventores" (*Inventor's academy*), run by Edelvives group. Using the mentioned STEAM techniques, together with the "Do It by Yourself" principle, "it enhances general digital skills, as well as co-operative work, critical thinking and entrepreneurship"[36]. They offer a complete learning package encompassing computer programming, 3D design, Internet of Things (IoT) and robotics for people between 3 to 18 years old.

Education within the university has undergone the same abrupt shift, but its contextual conditions are not the same. In fact, the online format was already a reality for many of the students attending to lessons from the Spanish online universities[37], such as UOC*, UNIR*, USAL*, Universidad Alcalá de Henares* or UDIMA*. According to Àngels Fitó, head of Competitiveness and Employability areas of the UOC[38]:

> "It is important to distinguish between the emergency online learning recently implemented and the online learning conceived to be steadily virtual (…). It is not about transforming in-person mode to an online environment, but about designing a learning model where the student can reach the abilities and the results successfully".

Nevertheless, traditional in-person universities are highly contributing to the collective endeavour towards digital skills learning. During the school year 2020/21 many universities all

[34] García, J. 2020. "La odisea de la educación online impuesta por el coronavirus". Seen on elpais.com, 22nd April. Access: https://elpais.com/retina/2020/03/22/innovacion/1584868868_589467.html

[35] Martín, L. 2020. "Los auténticos nativos digitales". Seen on telos.fundaciontelefonica.com, 22nd April. Access: https://telos.fundaciontelefonica.com/telos-112-experiencias-luis-martin-academia-de-inventores-los-autenticos-nativos-digitales/

[36] Seen on: https://academiadeinventores.com/academia/

[37] Moscardó, I, 2020. "Elearning": formarse o reciclarse para mejorar la empleabilidad". Seen on cincodias.elpais.com, on 22nd April
Access: https://cincodias.elpais.com/cincodias/2020/04/22/extras/1587542058_045332.html

[38] Moscardó, I, 2020

over Spain are implementing new grades and certificates responding to the ICT labour market's demand. The Fundación CyD have compiled the new offer Spanish university are furnishing[39], notwithstanding the continuous updates implemented to the existent degrees:

Universitat Autònoma de Barcelona	- Biocomputing science degree. - Science degree.
Universidad de Deusto	- Data science and artificial Intelligence degree - Robotic engineering degree. - Data Analytics certificate
Universidad Autónoma de Madrid	- Biomedical engineering degree - Science degree
Universitat Ramon Llull	- Digital media degree
Universidad Politécnica de Madrid	- Data science and artificial intelligence degree. - Engineering and data system degree.

[39]Fundación CYD. "¿Cuáles son los nuevos grados 2020-2021 de las universidades españolas? Access: https://www.fundacioncyd.org/nuevos-grados-2020-2021-universidades-espanolas/

3.2 Conclusions

- Digitalisation process has been deploying a remarkable performance in Spain for the last years. It is widely accepted by both Spanish public institutions and private agentsthat it is a necessary step towards a modernisation of Spanish economy.
- By now the undertakenefforts have proved to be very meaningful in some essential dimensions, such as connectivity infrastructure and Public Administration services.
- Yet reports indicate considerable concerns especially regarding to digitalisation skills training, since Spain ranks under-average results in fields such as digital literacy, volume of ICT professionals and SME's adoption of digital technologies.
- COVID-19 pandemic crisis is steadily increasing the digital demands of a growing number of customers, workers, enterprises, and citizens. Teleworking and online education are opportunities that need a more focused institutional attention to optimise their profits and offset the threats that specific groups of people may encounter.
- Spanish institutions and private agents are building altogether a national response to COVID-19 crisis aligned with the existent goals in terms of digitalisation. The Spanish recovery, transformation and resilienceis a clear evidence of it.
- Spanish economy will have to face severe difficulties to promote a nationwide, inclusive development. Measures and policy must be implemented to make digitalisation an opportunity for all groups of people, tackling the gender and regional gap, as well as the skyrocketing number of jobless young people.
- Therefore, digital education will be a flagship policy to be implemented through a digital skills national plan, that is €3.59 billion budgeted.

4. Annexes

(*) Glossary

- AVS Hub: it is the Spanish plan to promote its audiovisual sector.
- INE (Instituto Nacional de Estadística): official agency collecting statistics about Spanish demography, economy and society.
- Estrategia para la Digitalización del Sector Agroalimentario y Forestal y del Medio Rural: Spanish strategy aimed to agriculture digitalisation.
- Estrategia Nacional Industria Conectada 4.0: Spanish strategy aimed to industry digitalisation.
- Estrategia de Internacionalización de la Economía Española 2017-2027: Spanish strategy aimed to the internationalization of Spanish economy.
- Plan Estratégico de ICEX España exportación e inversiones (ICEX): Spanish strategy aimed to trade investments.
- Plan Estratégico de Formación Profesional del Sistema Educativo 2019-2022: A stratregy plan aimed to enhance modernisation of the VET system.
- PERTE (Proyectos Estratégicos para la Recuperación y Transformación Económica): Strategic Projects for recovering and economic transformation approved by the Spanish government, within the Recovery Plan special framework.
- Real Decreto-ley: a bill passed through an urgency procedure.
- Universidad Autónoma de Madrid (UAM): a Spanish public university located in Madrid.
- Universidad a Distancia de Madrid (UDIMA): an online private university located in Collado Villalba, Madrid.
- Universidad Internacional de La Rioja (UNIR): an online private university located in La Rioja.
- Universitat Oberta de Catalunya (UOC): an online private university located in Catalunya.
- Universidad de Salamanca (USAL): a Spanish public university located in Salamanca.
- Universidad Alcalá de Henares (UAH): a Spanish public university located in Alcalá de Henares (Madrid) and Guadalajara.