Journal of Liberty and International Affairs | Volume 8 · Number 1 · 2022 | eISSN 1857-9760
Published online by the Institute for Research and European Studies at www.e-jlia.com

Peer review method: Double-Blind
Accepted: December 18, 2021
Published: February 02, 2022
Original scientific article
DOI: https://www.doi.org/10.47305/JLIA2281211co

RURAL DEPOPULATION IN SPAIN: NEXT GENERATION EU AS A STIMULUS TO ACCELERATE THE TRANSFORMATION

Marcin Roman Czubala Ostapiuk*
National University of Distance Education, Spain
ORCID iD: https://orcid.org/0000-0002-0298-7609
mczubala@cee.uned.es

Mónica Puente Regidor
Complutense University of Madrid, Spain
ORCID iD: https://orcid.org/0000-0003-0089-5898
mpuenter@cps.ucm.es

Carlos Corullón Hermosa
Complutense University of Madrid, Spain
ORCID iD: https://orcid.org/0000-0002-1726-8308
ccorullo@ucm.es

Abstract: *The main objective of this study was to examine the situation of depopulation in Spain. Also, to highlight the importance of digital transformation and the funds provided through the Next Generation EU (NGEU) to fight against this phenomenon. Based on data from the National Institute of Statistics (INE), an empirical investigation about the current state of population abandonment in Spain has been carried out. Moreover, the Digitization Index (DiGiX) has been used to obtain a territorial vision about the digitization degree of the Autonomous Communities (CCAA). Finally, the estimates of the Spanish executive set out in the National Recovery, Transformation and Resilience Plan (RTRP) have been used to underline the importance of Next Generation EU resources to fight the problem of 'empty Spain'. That was to see that mentioned country is currently at the head of the 'demographic deserts' of the EU. Likewise, the Recovery Plan for Europe, and its digital axe, constitute one of the key factors to combat the population abandonment of the Spanish rural areas. In other words, an important approach, which addresses the wide deficiencies in the literature on the subject, is making this research highly relevant and interesting.*

Keywords: *Depopulation; Spain; Next Generation EU; Recovery, Transformation and Resilience Plan; Digital transformation; EU*

INTRODUCTION

Depopulation forms a phenomenon that converges and is reinforced both by increasing urbanization and the senescence of societies in developed countries. A process through which a region, or municipal nucleus, suffers a sustained reduction in

population density over time (Aerin *et al.* 2008). Within this context, Spain is one of the States with the greatest problems in terms of population abandonment in Europe, an event that has been accelerated in recent years (National Office for Strategic Foresight 2021). The existence of Spanish provinces in a critical situation, with municipalities at serious risk of irreversible depopulation and high rates of aging, is already a fact. In addition, the null generational change, the low birth rate, or the scarcity of job opportunities is other causes and major challenges that aggravate the condition of its rural areas. Therefore, the lack of reversal of the present situation can lead to overpopulation of specific zones, especially the coasts and other urban environments, seriously affecting the entire geographical and human landscape of the Iberian country. However, several initiatives try to combat depopulation and its negative effects, although the fragility of its effects seems to continue to be pronounced.

On the other hand, the Next Generation EU funds, together with the resources of the European Union's long-term budget for 2021-2027, aim to promote the re-launch of economic activity and employment in all the EU Member States. What is more, focused on two transversal axes (green and digital), it is to reinforce confidence in the continuity of the European project through a long process of structural reforms and transformation, increasing the degree of fiscal responsibility and commitment to macroeconomic stability, where Spain will foreseeably be one of the countries that will benefit the most (Bańkowski *et al.* 2021, 6-7). Those modifications, designed according to each Member State, will be configured following its particular economic, political, and social conditions and the agreed Recovery, Transformation, and Resilience Plan. Thus, its implementation in the Spanish context should serve, among others, to promote solutions to the problem of rural depopulation, providing a stimulus to accelerate the digital transformation of the local environment and its adjustment to the productive needs of the XXI century, where the digitization of the economy is already a key element for economic growth, both current and future.

Finally, and based on the review of the existing literature, the presence of studies carried out both on population abandonment in Spain, as well as the political basis of the Recovery Plan for Europe, its configuration and financing, is observed. However, there is a considerable lack of research linking the importance of its digital transition aspect to combat the problem of depopulation in the Member States. Consequently, this analysis aimed to address the gap in the academic literature, reflecting the possibilities generated by digitization and the implementation of the Next Generation EU for Spain about its demographic and territorial challenges.

METHODOLOGY

Hence, the main objective of this research was to study the depopulation situation of the Iberian country, as well as the scale of the digital transformation and the funds provided through its National Recovery, Transformation and Resilience Plan (RTRP) to fight this phenomenon. Also, a series of secondary objectives were established: a) to detail the characteristics and severity of the situation of population abandonment in rural Spain, b) to analyze the situation and progress of its Autonomous Communities in the context of digitization, c) to indicate the place of the Recovery Plan for Europe funds within the Plan of Measures against the Demographic Challenge of the Government of Spain, as well as d) to underline the importance of the resources of the mentioned RTRP, placing special emphasis on its Component 15, to fight against the problem of 'empty Spain'.

Furthermore, its development allowed us to verify the main hypothesis: Spain is at the head of the 'demographic deserts' of Europe, with the Next Generation EU, and especially its digital axe, being one of the key factors to combat population abandonment in its rural areas.

To complete the paper, first, a detailed analysis of the literature and other sources of information has been carried out. Subsequently, based on data from the National Institute of Statistics (INE), an empirical investigation has been carried out evaluating the current state of depopulation in Spain, also making specific references to the context of the European Union. Moreover, the Digitization Index (DiGiX) has been used to obtain a territorial vision about the digitization degree of the Autonomous Communities (CCAA). Finally, the estimates of the Spanish executive exposed through the Recovery, Transformation, and Resilience Plan have been used, placing special emphasis on its Component 15 to underline the importance of Next Generation EU funds to fight the problem of population abandonment in Spain, as well as a series of guiding principles, has been proposed.

Therefore, the carried-out study has been based on the deductive research model (Woiceshyn and Daellenbach 2018). Likewise, a mixed methodological design has been applied (Denzin 1970), always from an interpretive paradigm. This has been intended to address the enormous novelty of the subject, understand better its different aspects, make up for the insufficiency of the information contained in the literature on the subject, together with ensure the quality of the obtained conclusions.

CONTEXT

Following the above, seeking to promote the quality of the conducted research and obtain the most complete results, it has been considered appropriate to delve into the current situation and the progress of the Spanish regions in the field of depopulation and digitization first.

The Phenomenon of Spanish Depopulation

From a chronological point of view, the phenomenon of population abandonment in Spain is not new, nor does it respond to homogeneous characteristics at the territorial level that would allow us to make a rapid diagnosis of the situation. It forms a complex process where historical studies show that already in the XVIII century the national territory suffered from a lack of inhabitants concerning its territorial capacity (Nadal 1975). In contemporary times, Spanish depopulation is linked to the structural economic transformation that began in the 1950s and was consolidated in the following decades (Ródenas and Martí 2005). Even though the population growth rate (between 1950 and 2019) was 67.2%, the trend has been that rural areas lost residents with particular intensity, even if we take into account areas where high densities are still reached (see Figure 1).

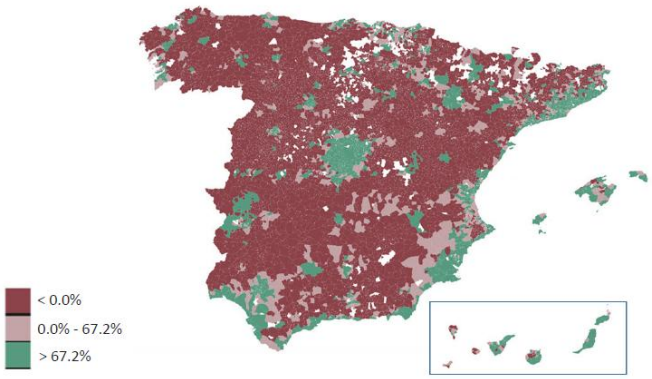

Figure 1: Population Growth Rate of Spanish Municipalities between 1950 and 2019 (%) (Source: Bandrés and Azón 2021; INE)

In the XXI century, depopulation in Spain has taken on a new political dimension. The consequences of a lack of territorial harmonization have emerged in different social movements and political parties with national parliamentary representation and that demand a greater economic, political, and social structuring of the entire territory. Among their claims are the promotion of public investments in infrastructure to improve

communication with urban areas, the implementation of basic public services that allow living in safety, expanding the networks that facilitate the digitization of the most isolated zones, and the revitalization of the economy, as well as business support in rural areas. In 2019 (Figure 2) the population density in Spain was 92.9 inhabitants/km^2, where we find areas with a significant population such as large cities, including Madrid, Barcelona, Bilbao or Seville, also in the Mediterranean arc and in the Spanish archipelagos (the Canary and Balearic Islands).

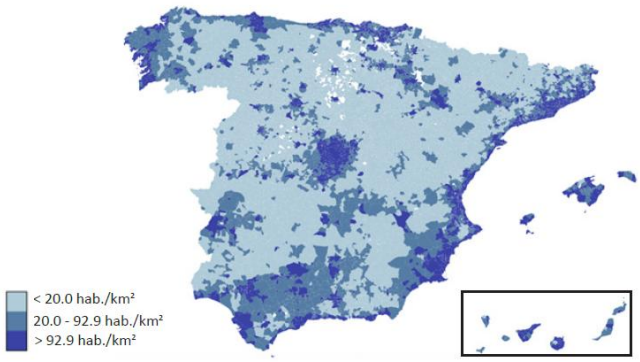

Figure 2: Population Density of Spanish Municipalities 2019 (Inhabitants/km^2)
(Source: Bandrés and Azón 2021; INE)

Accordingly, Spanish territorial depopulation can be defined by two elements. On the one hand, those provinces have had a negative growth rate between 1950-2019 (Collantes and Pinilla 2019) and, on the other hand, those that have a population density lower than the national average. In this classification, we would be leaving out the provincial capitals and cities with more than 50,000 inhabitants. Following these criteria, the provinces in which there are territories that can be considered as depopulated areas are twenty-three: nine provinces of Castilla y León (Ávila, Burgos, León, Palencia, Salamanca, Segovia, Soria, Valladolid and Zamora), three of Aragón (Huesca, Teruel, and Zaragoza), four from Castilla-La Mancha (Albacete, Ciudad Real, Cuenca, and Guadalajara), two from Extremadura (Cáceres and Badajoz), two from Galicia (Lugo and Ourense), two from Andalusia (Córdoba and Jaén) and La Rioja.

In addition, we can highlight three elements that show that the phenomenon of depopulation in Spain not only responds to the total volume of the population but that there are also other determinants on the demographic structure that help to better understand the process. In the first place, the groups of young people, and working-age, are the cohorts that account for the main part of the emigration that takes place in rural and medium-sized municipalities.

Second, the aging of the inhabitants that remains in rural areas (on average, 16% of the Spanish population is over 65 years of age, although many of the provinces of

depopulated Spain are well above this figure). And, thirdly, the agricultural sector has the greatest weight in the economic structure of unpopulated zones. The reduction of the need for labor in agriculture, and in the productive activities linked to it, was not offset by the development of other sectors with the capacity to generate employment, being the growth in production between 1950 and 2019 very uneven among the Spanish provinces.

It is also worth noting that Spanish citizens not only direct their gaze to the need for greater territorial harmony in national terms but also for the whole of the European Union. If we compare the population density of Spain with other large Member States (see Figure 3), we observe that its 93 inhabitants/km^2 are far from France (119), Poland (124), Italy (206) or Germany (240), being important also concerning Denmark (136) or Portugal (112) results, which are considered medium countries. The differences are even greater compared to other smaller States, such as Belgium (381) or the Netherlands (507). On the other hand, Spain does surpass Greece (81) and, of course, the members that make up the Scandinavian Peninsula: Sweden (24) and Finland (18) (BBVA Foundation 2019).

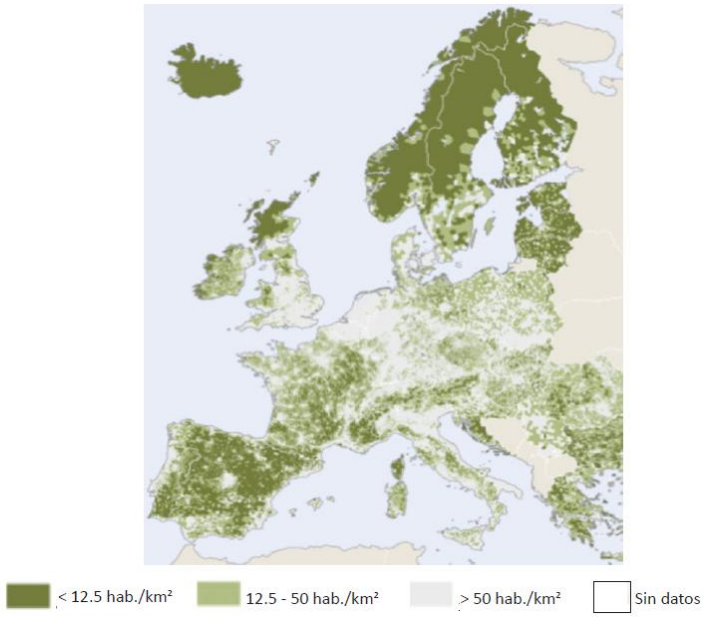

Figure 3: Sparsely Populated Areas in Europe (Source: Spatial Foresight 2015)

Furthermore, this claim has a European legal basis. In the Treaty on the Functioning of the European Union, the economic cohesion of the territory is a necessary element to stimulate the economic growth of the EU, which, as explained in article 174, implies special protection to rural areas, zones affected by the industrial transition, and regions suffering from severe and permanent natural or demographic handicaps, such as the northernmost regions with a low population density and the

island, cross-border and mountain regions. Likewise, we can find numerous provisions and resources that, in the context of the Union's regional policy, seek to promote the development of territories with low population density. Although the phenomenon of depopulation, to a greater or lesser extent, affects all Member States, the fight against depopulation is one of the main priorities of the Vice-Presidency for Democracy and Demography of the European Commission (Čipin *et al.* 2020).

In short, the process of population abandonment is not only Spanish but also a European phenomenon and requires a common effort to consolidate strategic management measures that encourage investments in demographically disadvantaged areas in comparison to large urban centers, thus dynamizing economically, harmoniously, and cohesively, the most depopulated territories of the European Union.

The Autonomous Communities and the Digitization

Given the specificity of the object of study of this research and seeking to complete an empirical exercise from a disaggregated approach, the analysis of the performance of the Autonomous Communities in the field of digitization has been carried out by interpreting the results of the Digitization Index (DiGiX) by 2020. That is, a tool based on six key dimensions (infrastructure, affordability, user adoption, business adoption, regulation, and government adoption) and 19 indicators (11 of them, common to the whole of the Spanish geography, are relevant only on a national scale, while the remaining 8 differ at the level of the CCAA) (Cámara 2020), which allows us to make a diagnosis and appropriate comparisons taking into account the peculiarity of the territorial and administrative division of Spain. In other words, a starting point for the management of EU resources and the correct promotion of the digital transformation of the studied country and its economy. Analyzing the global data of the selected index, jointly for the 17 Autonomous Communities, we observed their wide degree of heterogeneity, with the existing inequalities also maintained over time. Only three of the regions (the Community of Madrid, Catalonia, and the Valencian Community) are above the average for the entire Spanish territory. On the other hand, Cantabria, Murcia, and La Rioja stand out among the worst positioned (see Figure 4). Furthermore, if we compare their performance based on the ratio of digitization to income *per capita* (Figure 5), the Community of Madrid, again, obtains the best results, followed by Catalonia. Curiously, the Basque Country, Aragón, the Balearic Islands, or La Rioja, despite having a high income, do not present a remarkable level of digital development, which reduces their final ranking. On the other hand, focusing on the level of digitization, the Valencian Community, with a more modest per capita income, is positioned in third place of all Spanish territories.

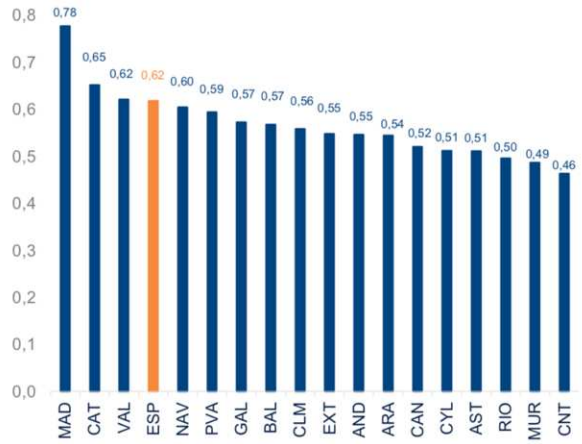

Figure 4: CCAA (Min=0, Max=1; 2020) (Source: BBVA Research)

Figure 5: Autonomous Communities and the GDP (2019) (Source: BBVA Research; INE)

Now, to better understand the state of affairs, as well as to be able to highlight the weaknesses and points of improvement in the digital context of Spain, it is necessary to study the data in a more granular and specific way. To do this, first, the information regarding the dimensions of infrastructure and affordability has been analyzed. Thus, we observe that the coverage of digital infrastructures (of at least 4G) is present in a massive way throughout the entire geography of the country. However, even though its expansion allows the greater use of technological advances and in a more productive way, there are still significant obstacles in both areas. Accordingly, among the regions, which are best equipped with internet access there are the Community of Madrid, the Balearic Islands, the Basque Country, and Catalonia (Figure 6). On the contrary, the worst positioned are Castilla y León, Aragón and Castilla-La Mancha. Also, rural and sparsely populated areas often lack access to broadband internet, this being at the same time one of the key factors that could slow down the phenomenon of population abandonment.

As for the race towards 5G, which fosters the productive capacity of companies, the consumption of individuals, and the offer of public services, it is another challenge to face. Its use, which requires the fiber optic infrastructure, varies significantly depending on the analyzed region. Once again, the Community of Madrid is at the top of the list. 97% of its households have the coverage in question. It is followed, although with an important difference, by the Community of Castilla y León, Cantabria, Extremadura, and Galicia, with a lower population density, and whose fiber optic coverage is 50%-65% (Figure 7).

Summarizing, encouraging the spread of 5G technology in the most affected regions would undoubtedly help to promote the existing territorial structure in the state context, creating new opportunities and promoting technological solutions in the framework of demographically disadvantaged areas.

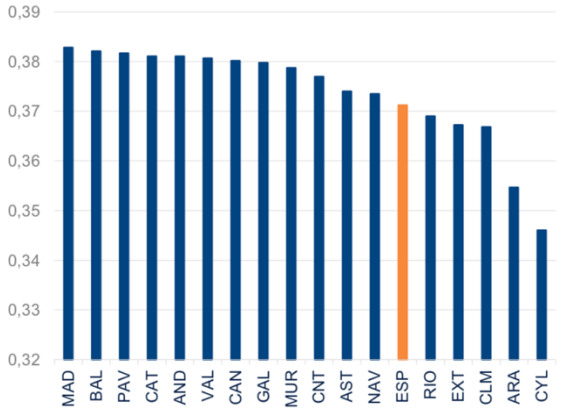

Figure 6: Infrastructure Dimension (Min=0, Max=1; 2020) (Source: BBVA Research)

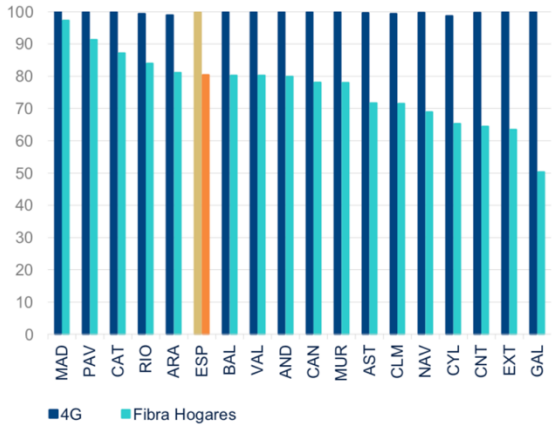

Figure 7: 4G and Fiber Optic Coverage (% Households 2020) (Source: BBVA Research)

Second, and about consumer adoption (the use of the internet, the type of connection, and the digital skills of society), Spain is located somewhat below the community average (EU-28) (Cámara 2021, 3-4). As well, it is estimated that about 43% of Spaniards lack basic digital skills (Czubala Ostapiuk and Benedicto Solsona 2021, 125). That is a set of skills that allows the correct use and exploitation of the services and infrastructures in question. From a regional point of view, the Community of Madrid, Catalonia, the Valencian Community, Navarra, and the Basque Country present results above the national average (see Figure 8). On the other hand, Galicia and Cantabria are two regions where the adoption rate is lower. Reviewing the frequency of internet use, we also observed that the Autonomous Communities with digitally mature populations are those that present the best connectivity indices.

Third, taking into account the adoption of business entities, we perceive the least degree of homogeneity between the Autonomous Communities, being the scope of implementation of digital services and technologies (which have a potential to improve productivity) by agents in question a context that requires substantial improvement in Spain. The Community of Madrid, again, is at the top of the Spanish ranking; while it is followed by Catalonia and the Valencian Community (Figure 9). At the same time, Murcia, La Rioja, and Cantabria stand out among the worst position. It is worth emphasizing, if we focus on the use of the cloud and big data, that the differences in their use between small and medium-sized companies (SMEs) and large entities also stand out. An essential gap to reduce to promote competitive, innovative economic activity that generates a greater multiplier effect.

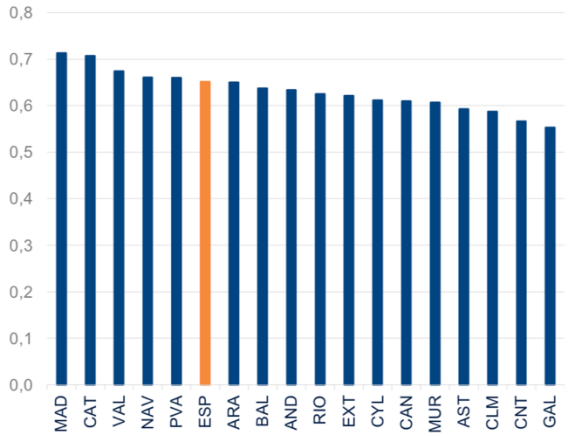

Figure 8: User Adoption Dimension (Min=0, Max=1; 2020) (Source: BBVA Research)

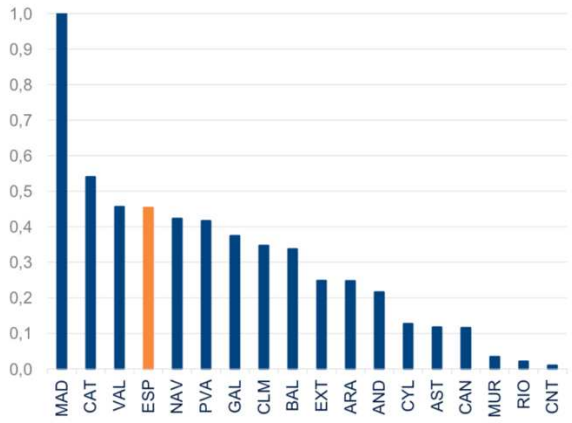

Figure 9: Enterprises Adoption Dimension (Min=0, Max=1; 2020) (Source: BBVA Research)

Finally, the dimension of regulation and adoption by the public sector should be studied. Spain, in the community context of the 28 Member countries and concerning the digitization of public administration services, presents high results (Czubala Ostapiuk and Benedicto Solsona 2021, 124). If we examine the data at the regional level, the Community of Madrid, Catalonia, and the Valencian Community lead the national ranking. Also, La Rioja and the Canary Islands (unlike the other dimensions) obtain a performance above the Spanish average, having a high percentage of users of public digital services. Among the worst positioned there are the Basque Country, the Balearic Islands, and Cantabria (Figure 10).

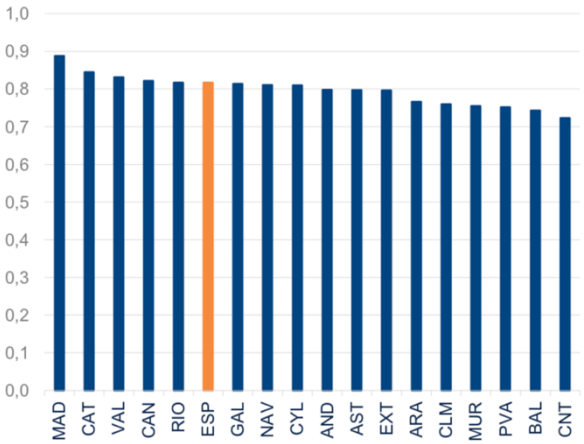

Figure 10: Use of the Internet to Interact with the Public Administration (% Enterprises and the Internet Users, 2020) (Source: BBVA Research; INE)

If we analyze the interaction of citizens and economic entities with the Spanish public administration, by means of digital media, in proportion, it is companies that bet the most on this channel of contact. This confirms that, regardless of the possible improvement on the supply side, there is a significant margin for betterment by individuals. Although this does not constitute the direct object of this research, it is worth noting that within its possible causes there is the lack of knowledge and necessary skills on the part of the population (an aspect highlighted above) or the deficiencies of the offered public digital services. Both, being able to be mitigated in the coming years through the different actions of the State administration and allowing, without a doubt, to combat the depopulation rates in Spain.

Next Generation EU and the Plan of Measures against the Demographic Challenge

Once the situation of the Iberian country regarding the phenomenon of depopulation, as well as the level of digitization of its Autonomous Communities, has been reviewed, it is convenient to ask ourselves what is the place of the funds of the Recovery Plan for Europe within the Plan of Measures against the Demographic Challenge of the Government of Spain?

As we have seen, the demographic and cohesion goal requires coordinated action, based on polycentric territorial development. For this, the Plan of Measures against the Demographic Challenge (Government of Spain 2020) forms the Spanish articulation of a strategic response (established basing on the National Strategy against the Demographic Challenge), in the short and medium term, aligning with: the 2030 Agenda and the Sustainable Development Goals (seeking to revitalize the rural environment and face the demographic challenge); the Spanish Urban Agenda (connecting urban and rural environments); the National Plan for Adaptation to Climate Change, the National Integrated Plan for Energy and Climate, the Just Transition Strategy, or the long-term Strategy for a modern, competitive and climate-neutral Spanish economy in 2050 (with an emphasis on the ecological transition and decarbonisation); the Spain Digital 2025 agenda (promoting digital transformation throughout the state territory); the Guidelines established by the European Regional Development Fund (ERDF) regulation for the 2021-2027 period (focusing on the use of new criteria for evaluating the geographic cohesion, among others), as well as the Next Generation EU funds (seeking to eliminate aggravated social and territorial fractures or those caused by the Covid-19 pandemic).

In this way, the National Recovery, Transformation, and Resilience Plan (Government of Spain 2021) is one of its key pieces, providing a set of measures, including those about digital transformation, one of its four priority axes. Along with the ecological transition, social and territorial cohesion, and the elimination of the gender gap, it is an essential element to deal with the organization and convergence in the

territory, understood as a social construction. Therefore, the abandonment of the population is approached in its framework in a transversal way, basically through the set of leverage policies and their singular components. In addition, it corresponds to the different levels of public administration to support the reactivation, adaptation, and economic diversification of depopulated rural areas based on the approval and implementation of the driving policies and actions, as well as creating a favorable and flexible environment for the different economic agents (to facilitate their performance, the promotion of innovation and full digital connectivity, among others). Whether based on a procedure of stimulus, direct support or favoring entrepreneurial and innovative initiatives in demographically disadvantaged areas.

As a consequence, the improvement of territorial cohesion, the reduction of the gap between the urban and rural environment, as well as the action in the most affected (by the analyzed phenomenon)rural areas, without losing sight of the green and digital recovery, confirms the full alignment of the Plan of Measures against the Demographic Challenge of the Government of Spain with the Next Generation EU, promoting its implementation in the zones and sectors most in need, under the definition of objective criteria and ensuring the correct use of the provided funds.

DISCUSSION

Digitization, a powerful concept linked to the progress of modern economies and brought to life through the development and implementation of operations enabled by digital tools, both in economic, social, and political processes (Brynjolfsson and McAfee 2015), can be the key to promoting the active settlement of rural areas and stimulate the local productive structures, making it a more attractive and diversified place, generating wealth and employability in its context, with special attention to women and young people. For that reason, the implementation of new technologies, the reduction of the digital divide of the entire national territory, or the promotion of the use of data seem essential elements to encourage territorial cohesion and avoid obstacles caused by rural generational change.

As mentioned before, digital transformation is also one of the transversal axes of the Recovery Plan for Europe, being the European Commission the one to set up the different crucial areas to stimulate the degree of digitization of the Member States. A priority action for the Spanish executive, to which it will allocate 19.6 billion Euros (28% of total assigned funds, significantly above the minimum requirement of 20% for the common digital objective) (European Commission 2021).

Through its National Recovery, Transformation, and Resilience Plan (reflected in the General State Budgets that incorporate new financing instruments of the European Union, as well as articulated by the execution of the Structural Funds for the 2021-2027 period), and specifically its Component 15 'Digital Connectivity, Promotion of

Cybersecurity and Deployment of 5G' (which is part of the policy lever V 'Modernization and Digitization of the Industrial Fabric and SMEs, Recovery of Tourism and Promotion of an Entrepreneurial Nation Spain'), it has the objective to ensure connectivity throughout the national territory, to lead the deployment of networks and services based on 5G technologies, as well as to position Spain as an international infrastructure and talent hub in the field of cybersecurity. Likewise, it includes key measures for the development of economic activity, increased productivity, and the drive for innovation, therefore, for territorial and social structuring.

Fully intended to support the digital transition, with a public allocation of 3,998.6 million Euros (equivalent to 5.75% of the National RTRP), the Component in question will respond to the specific country recommendations (structured around the three main areas of performance: connectivity, 5G and cybersecurity) (Government of Spain 2021). It is expected that its impact will exceed the volume of resources mobilized in a broader context and of contribution to economic and social improvement, thanks to the deployment; promotion, and multidimensional implementation of innovation and digital tools (Table 1).

Table 1: The Main Impacts derived from total Investment (Public and Private) for Component 15 (in Millions of Euros) (Source: Own elaboration; based on the Government of Spain 2021)

Area	Total Investment	Impact on GDP	Total Impact on Employment (Positions Covered on an Annual Average)	Jobs Covered (for Every Million Euros Invested)
Connectivity	7.740	12.100	31.574	16
5G	6.160	9.600	21.355	14
Cybersecurity	2.096	3.000	8.109	15
TOTAL	16.000	25.000	61.037	15,28

In this way, the justification for its action is reinforced not only by the characteristics of the social structure of the Spanish rural environment but also by the fact that the implementation of digital processes in the studied territorial context will favor its economic activity, promoting the active settlement and the creation of quality jobs in the rural economy, facing the current and pending challenges of the communities in question. Regarding employability, it is important to note that the Government of Spain foresees that the employment rate promoted through the implemented measures, within the framework of Component 15, will not be reduced to the branches of activity that have direct investment, but also, and in an induced way, they will benefit the related sectors, producing wealth and movement in the national economy as a whole, always aligning with the orientations of the National Strategy against the Demographic Challenge with the additional objective of contributing to

stopping the population abandonment of the demographically disadvantaged areas. Nor should it be forgotten that (regarding the discussed actions) the European Commission itself estimates a multiplier effect of 3 Euros of private investment for every euro spent by the public administration, which again highlights a possible scale of direct impact on the Spanish economic situation, the productive and industrial structure, and its different sectors, reverting to the whole of its economic system and the society of the Iberian country.

Therefore, the greater digitization of the Spanish territory will undoubtedly improve the competitiveness and quality of life of citizens of demographically disadvantaged areas, without losing sight of other related public policies, with technology being one of the levers to eliminate existing obstacles and creating new opportunities. In any case, it is also worth indicating some guiding principles to take into account in order to reinforce the effectiveness of the actions to be undertaken: a) provide the population with digital skills areas; b) link digital transformation with sustainable development, improving the capital of rural areas and responding to the expectations of their communities; c) ensuring the participation of local agents, seeking to adapt digitization to specific contexts and their needs; d) basing digitization on equality of access to possibilities, preventing the possible marginalization or polarization of social and economic groups in demographically disadvantaged areas; e) promoting the creation of local digital ecosystems ensuring the correct transmission of technological solutions to meet the needs of communities in question; f) develop new models of digital governance, more inclusive and adaptable, that take into account the casuistry of the rural environment, as well as h) develop public policy instruments for sustainable digitization and that facilitate the approval and fulfilment of digitization action plans in local environments.

CONCLUSION

Historically, but also today, economic factors have been the ones that have most influenced the phenomenon of depopulation. Many of the regions most affected by population abandonment tend to be economically depressed or barely dynamic areas compared to other zones of the same country (Collantes and Pinilla 2019). The implementation of asymmetric industrial policies at the regional level, as well as the different mechanisms of territorial financing, have caused, over time, that nowadays rural areas have a smaller stock of transport and telecommunications infrastructures, as well as a lower level of provision of public services. A scenario that is observed through the development of this research, where the deficiencies in the level of digitization of the Autonomous Communities agree with the results regarding the number of demographically disadvantaged areas in their framework. That is, a phenomenon that prevents population concentration from occurring, causing a little volume of

employment to be generated, as well as less innovation and knowledge transfer (Rodríguez-Pose 2018). Not to mention negative vegetative growth, a drop in fertility, or an insufficient migratory balance. In this way, the digital transformation is a crucial step towards promoting social and territorial cohesion, helping to reverse the situation of depopulation and increasing the level of national structuring. By revitalizing demographically disadvantaged areas, it reduces the geographic gap of rights and opportunities (especially in the case of women and young people), promoting the necessary conditions for entrepreneurship and job creation, as well as the provision of services under conditions of equality. In addition, this connectivity must be linked to digital training, not only for different economic sectors but also for individuals, with a specific focus on the most vulnerable groups in the face of the digital divide.

Therefore, the gap between rural and urban areas justifies a major effort to further digitize the entire Spanish territory, facilitating access to digital services. Thus, the Next Generation EU funds to digitize the rural environment constitute one of the fundamental elements to mitigate the phenomenon of depopulation in Spain. These resources must guarantee the development of high-speed fiber-optic connections in sparsely populated municipalities, promote the digitization of economic and productive sectors that are still in rural areas, besides being coordinated with other cross-cutting initiatives based on the digital economy, such as the effective implementation of telework (in those productive sectors in which it can be implemented without any detriment to their activity), allowing the relocation of workers from large urban areas to different local environments.

Finally, and following what was pointed out by Bandrés *et al.* (2020), we will likely witness a significant time lag between the need to boost economic growth in the short term and the structural reforms whose full results will unfold in the long term (Xifré 2020), this being one of the greatest challenges of the Spanish society about the use of Next Generation EU funds, including in the context of the fight against depopulation. In any case, it should not be forgotten that the digital transformation itself, driven in its context, should not be perceived as the end, but rather as an inclusive process that contributes to the sustainable development of rural areas.

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. Aerin, Jacob, Vaccaro, Ismael, Hartter, Joel, and Chapmans, Colin. "Integrating landscapes that have experienced rural depopulation and ecological homogenization into tropical conservation planning." *Tropical Conservation Science*, nº 1 (4) (2008): 307-320.
2. Alcidi, Cintia, and Gros, Daniel. "Next Generation EU: a large common response to the COVID-19 crisis." *Intereconomics* 55, nº 4 (2020): 202-203.
3. Bandrés, Eduardo, Gadea, Lola, Salas, Vicente, and Sauras, Yolanda. "España y el Plan Europeo de Recuperación." *Cuadernos de Información Económica*, nº 277 (julio-agosto) (2020): 9-23.
4. Bandrés, Eduardo and Azón, Vanesa. La despoblación de la España interior. Madrid, 2021.
5. Bańkowski, Krzysztof, Ferdinandusse, Marien, Hauptmeier, Sebastian, Jacquinot, Pascal, and Valenta, Vilém. "The macroeconomic impact of the Next Generation EU instrument on the euro area." *European Central Bank: Occasional Paper Series*, nº 255 (2021): 1-23.
6. Brynjolfsson, Erik, and McAfee, Andrew P. "La digitalización de prácticamente todo." *Harvard Deusto Business Review*, nº 215 (2015): 18-27.
7. Cámara, Noelia. *DiGiX 2020 Update: A Multidimensional Index of Digitization*. Madrid, 2020.
8. Cámara, Noelia. *DiGiX: el índice de la transformación digital de las CC. AA. como punto de partida de NGEU*. Madrid, 2021.
9. Čipin, Ivan, Klüsener, Sebastian, Recaño, Joaquin, and Ulceluse, Magda. "A Long-Term Vision for the Development of Rural Areas in Europe." Population and Policy, nº 27 (2020): 1-4.
10. Collantes, Fernando, and Pinilla, Vicente. *¿Lugares que no importan? La despoblación de la España rural desde 1900 hasta el presente*. Zaragoza: Sociedad Española de Historia Agraria, 2019.
11. Czubala Ostapiuk, Marcin Roman, and Benedicto Solsona, Miguel Ángel. "Next Generation European Union and the digital transformation: an opportunity for Spain." *Journal of Liberty and International Affairs* 7, nº 3(1) (2021): 118-135.
12. Denzin, Norman. *Sociological Methods: a Source Book*. Chicago: Aldine, 1970.
13. European Commission. *Analysis of the recovery and resilience plan of Spain*. Brussels, 2021.
14. BBVA Foundation. Despoblación de las provincias españolas. Madrid, 2019.
15. Government Commissioner against the Demographic Challenge. *Diagnóstico estrategia nacional frente al reto demográfico. Eje despoblación*. Madrid, 2020
16. Government of Spain. *Estrategia Nacional frente al Reto Demográfico*. Madrid, 2019.

17. Government of Spain. *Plan de Medidas ante el Reto Demográfico*. Madrid, 2020.
18. Government of Spain. *Plan de Recuperación, Transformación y Resiliencia*. Madrid, 2021.
19. 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.
20. Nadal, Jordi. El fracaso de la revolución industrial en España, 1814-1913. Barcelona: Ariel, 1975.
21. National Office for Strategic Foresight. *España 2050. Fundamentos y propuestas para una Estrategia Nacional de Largo Plazo*. Madrid, 2021.
22. Pinilla, Vicente, and Sáez, Luis Antonio. *La despoblación rural en España: génesis de un problema y políticas innovadoras*. Zaragoza: Informes Centro de Estudios sobre la Despoblación y Desarrollo de Áreas Rurales, 2017.
23. Ródenas, Carmen, and Martí, Mónica. "El nuevo mapa de las migraciones interiores en España: los cambios en el patrón de los sesenta." Investigaciones Regionales, nº 6 (2005): 21-40.
24. Rodríguez Pose, Andrés. "The revenge of the places that don't matter (and what to do about it)." *Cambridge Journal of Regions, Economy and Society*, nº 11(1) (2018):189-209.
25. Tapscott, Don. *The Digital Economy. Rethinking Promise and Peril in the Age of Networked Intelligence*. New York: McGraw-Hill, 1995.
26. 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*, nº 13(2) (2018): 183-195.
27. Xifré, Ramón. "El plan NGEU en España: retos estructurales y revisión de propuestas." *Cuadernos de Información Económica*, nº 279 (2020): 11-20.