

Brătucu, Gabriel; Nichifor, Eliza; Sumedrea, Silvia; Chițu, Ioana Bianca; Lixăndroiu, Radu Constantin

## Article

# Avoiding digital divide in European Union through European green deal

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## AVOIDING DIGITAL DIVIDE IN EUROPEAN UNION THROUGH EUROPEAN GREEN DEAL

Gabriel Brătu<sup>1\*</sup>, Eliza Nichifor<sup>2</sup>, Silvia Sumedrea<sup>3</sup>, Ioana Bianca Chi<sup>4</sup>  
and Radu Constantin Lixăndroiu<sup>5</sup>

<sup>1),2),3),4),5)</sup> Transilvania University from Braşov, Romania

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### Abstract

The digital society is threatened by the existing divide that seems to be deepening between the population that has access to information technology and the population that for some reason does not. The phenomenon of digital divide has become a very important issue in the process of transformation of society and the authors relate it to European Green Deal, in order to identify the determinants and ways to reduce the negative effects that will be eliminated according to the proposed schedule. For this purpose, a narrative review of the literature was used as a research method, corroborated with a multidimensional analysis of the data regarding the Internet access in the households from the member countries of the European Union. As a result, eight determinants of the digital divide were identified, along with four examples of how they can be addressed. According to the authors, the Deal, which has committed all 27 member states to create new opportunities for innovation, investment, and jobs, can support the positive transformation of European society, even against a backdrop of enormous challenges and huge impacts that we can now imagine.

**Keywords:** European Union Green Deal; digital divide in European Union; digital literacy; digital inclusion; digital society.

**JEL classification:** I24, J16, J24, O15, O19

\* Corresponding author, Gabriel Brătu – e-mail: [gabriel.bratu@unitbv.ro](mailto:gabriel.bratu@unitbv.ro)

### Authors' ORCID:

Gabriel Brătu: <https://orcid.org/0000-0002-9636-3660>

Eliza Nichifor: <https://orcid.org/0000-0003-2838-6155>

Silvia Sumedrea: <https://orcid.org/0000-0003-4325-4732>

Ioana Bianca Chi: <https://orcid.org/0000-0002-0608-8045>

Radu Constantin Lixăndroiu: <https://orcid.org/0000-0001-5238-5545>

## Introduction

The European Green Deal (EGD) generates new opportunities and challenges for all member states of European Union (EU), technologically and economically, socially, politically, and legislatively. From a technological perspective, the transfer to a green economy involves major changes (in areas such as energy, waste management, transportation, agriculture, construction, but also in many other fields) to address global climate change (Comisia Europeană, 2021).

From an economic point of view, these technological changes must enable the EU to remain globally competitive by identifying and using environmentally friendly resources in the shortest possible supply chains and in increasingly sophisticated operations (European Commission, 2021a). Thus, companies need to develop innovative business models based on clean and increasingly digital technologies to contribute to the sustainable transformation of the EU economy, and socially, the transformation of the economy and technologies must give citizens access to sustainable jobs, to education for the training of skills needed for this transition, but also to a better quality of life (through the use of products with a longer shelf life, living in renovated and energy-efficient buildings and the availability of healthy food at acceptable prices) (Comisia Europeană, 2021). From a political and legislative point of view, the EGD aims to achieve the goal of a single European market in all its components, including the labour market, in order to avoid a major divide in the knowledge, skills and abilities needed for an increasingly digitized forward-looking economy (European Commission, 2021a).

As EGD entails major changes across the EU, with the stated aim of “leaving no person or place behind” (Comisia Europeană, 2021), the aim of this paper was to conduct a thorough literature review regarding the factors responsible for the digital divide in the EU and how it can be mitigated to increase digital literacy and improve digital inclusion, which are necessary for the sustainable transformation of European society. The review of the current state of knowledge in the field was considered to identify the main factors that determine the digital divide. Thus, the analysis of the literature focused on issues such as: digital skills and literacy, the gaps caused by education, age, gender, and income, but also on the issue of digital natives and immigrants, (Prensky, 2001), and the content analysis examined documents, statistics, legislation, and policies recommended by the Commission and the European Parliament. The results obtained made it possible not only to identify the determining factors, but also to point out ways in which they can be counteracted in order to enable a sustainable transformation of European society into a digital one. The transition to an inclusive and sustainable European society is based on a holistic approach to the sustainable development goals formulated by the UN by integrating them into the provisions of the EGD, as part of the European Commission's strategy for 2019-2024 (European Commission, 2019). The authors consider that, through the proposed lines of action, both business and academia can contribute to the implementation of EGD provisions, as well as the objectives of sustainable development, aiming at quality education, decent work, and economic growth, but also reducing inequalities (United Nations, 2015).

The paper was structured in four sections: the review of the specialized literature, the research methodology, being followed by the presentation of the research results and the related discussions, and in the final part a series of conclusions is included.

## 1. Literature review

From an economic and social point of view, the digital society is threatened by the gap between the population that has access to information technology and the one that, for some reason, does not benefit from this opportunity. The digital divide represents the differences between people who have access to and use digital media and those who do not have these prerogatives, visible differences being both at the level of people and at the level of countries or areas of residence (urban / rural) (Van Dijk, 2020). The phenomenon of the digital divide is primarily related to the ability of citizens to use information technologies to increase the standard of living then to the Internet access (Plotichkina, Morozova and Miroshnichenko, 2020). The authors believe that this can be countered by the third point specified by European Commission (Comisia Europeană, 2021) in the EGD. A modern, competitive and resource-efficient EU economy “manages” to “leave no person and no place behind” ((Comisia Europeană, 2020). Based on this, the authors aim to promote the bridging of the digital divide between European citizens, a crucial condition for achieving the objectives of the EGD (Comisia Europeană, 2020), by identifying the determinants of the digital divide that have led to the existing significant gaps. The first aspect noted was the fact that the acceptance of technology is determined by the hope of achievement, habits, personality traits, but also by cultural factors (Chipeva et al., 2018). There are differences in behavioral patterns at the level of EU countries (due to uneven economic development), but also between different age groups, leading to inequalities between European citizens. (Rodriguez-Hevíá, Navío-Marco and Ruiz-Gómez, 2020; Sala, Gaia and Cerati, 2020).

Another dimension highlighted is the performance of EU member states and the monitoring of their progress in digital competitiveness, achieved through the Digital Economy and Society Index (DESI), which includes five components: Connectivity, Human Capital, Internet Use, Digital Technology Integration and Digitisation of Public Services. DESI 2020, calculated on the basis of data provided by countries for 2019, shows that Finland, Sweden, Denmark and the Netherlands have the most developed digital economies in the EU, followed by Malta, Ireland and Estonia, and at the opposite pole are Bulgaria, Greece, Romania and Italy (European Commission, 2020).

Regarding the digital divide, the researchers appreciate that there are several stages of it. The first is the access to the Internet, the second by the ability to use it and the third, is to achieve tangible results using this technology (Scheerder, Deursen and Dijk, 2017). For those interested, it is important to understand the steps involved because it should be noted that the digital divide continues to deepen even after the first step. Even when access to the Internet is guaranteed, there are material differences between people (in terms of devices, software programs, etc.) (van Deursen and van Dijk, 2019), the dominance of English at the international level further exacerbating the digital divide, as most content on the web is written in this language (Dhungana, 2021).

Technological evolution make it necessary for digital literacy to correlate with the necessary skills that are now considered essential (van Deursen and van Dijk, 2011; Bieză, 2020;). Digital literacy can be defined as the ability to acquire and produce information using digital technology (Yildiz, 2020). Three perspectives on it have been proposed in the literature, namely the perspective of digital natives born in the so-called “internet age” for whom the acquisition of knowledge is automatic, digital literacy based on the acquisition of skills and competencies without which individuals cannot succeed in society, and literacy based on socio-cultural factors, i.e. participation and belonging to these communities

(List, 2019). The predominant contrast in an information society is due to the “digital natives” term, which has emerged as a consequence of the qualities of the new generations who are endowed with the gift of mastering technology, at the opposite pole being the term “digital immigrants”, antithesis that outlines the generational gap (Dhungana, 2021). Digital literacy, considered the “catalyst for 21st century education”, has accelerated the advancement of education, with skills in the field becoming the tools that students use to survive in the age of technology-enhanced learning (Reddy et al., 2020).

Beyond the aforementioned aspects, the literature points out that the digital divide threatens the process of e-inclusion. It refers to the implementation of policies so that all inhabitants of a country can participate in the information society through easy access to technology and the use of ICT tools and services, as well as the ability and skills of all people to use these tools (Eurostat, 2021a). With regard to the inclusive society from a digital point of view, the authors emphasize the scale of a major challenge: what will happen to the population that cannot integrate into a society in which access to information technology ensures an increase in the standard of living (Plotichkina, Morozova and Miroshnichenko, 2020)? The persistence of growing differences in the quality of data infrastructure between urban and rural areas links the issue of connectivity to the issue of digital inclusion. General policies in this area emphasize the paradox of rural communities, which are in great need of improved digital connectivity but are the weakest connected and virtually excluded from the information society. The adoption of personalized policies for these communities by governments would focus on a combined approach to the issues of connectivity and digital inclusion (Salemink, Strijker and Bosworth, 2017).

The importance of e-inclusion emerges from the analyses that give it the character of a dependent variable in the equation of the development of a modern economy. A society in which all people have access to information has a direct and positive impact on other areas where digital literacy and access to technology are required. For example, digital inclusion is closely linked to financial inclusion through the common denominator of “digital currency”. Due to the existing digital divide and related inequalities, a potential central bank currency would be vulnerable. To close the gap, recently published studies even suggest offering free internet access in emerging economies to improve access to information (Noll et al., 2018).

## **2. Methodology**

Based on the research question, which aimed to identify the determinants of the digital divide, the authors set out to contribute to the literature with a “summary” of primary sources about avoiding gaps in the EU. At the same time, narrative review of the literature was used as a method because of its “important scientific function” in facilitating the approach to a broader type of questions (Baumeister and Leary, 1997). The research methodology was fleshed out using the steps outlined below, which enabled the analysis of the literature (Snyder, 2019). Subsequently, the authors aimed to describe the situation of households in the EU in relation to home internet access, which led to the analysis of data for the period 2005-2020 (information available for different periods of time on the Eurostat website).

### **2.1. Designing the narrative literature review**

Through the narrative review of the literature as a research method, it was possible to

connect the determinants of the digital divide to the solutions proposed in primary studies published in recent years. The aim of the paper is to promote measures to reduce the digital divide in the EU through EGD. Reconciling the priority of “leaving no person and no place behind” with a topical issue about the divide was possible through the use of this method, as it allowed the issue to be approached in a broader way, with the authors having the opportunity to “map and assess the relevant intellectual territory to specify a question that will further develop the knowledge base” (Tranfield, Denyer and Smart, 2003) – what are the determinants of the digital divide in the EU and how can they be addressed?

## 2.2. Information gathering

In order to solve the research problem as effectively as possible, the phase of documentation and collection of the necessary information for the analysis of the literature was carried out with the help of databases and electronic resources, which were centralized by the authors. For this purpose, 984 scientific resources were identified in the international databases Web of Science – Core collection, Google Academics and Science Direct Freedom Collection by searching the keywords “digital divide”, “digital divide factors”, “digital inclusion” and “digital literacy”. At this stage, it was very important to identify complementary publications for the purpose. Thus, centralization was achieved by adopting the source, title and abstract so that authors can filter the relevant papers for the study in the next stage. To make it more efficient, the abstract of each publication was extracted and read, with the authors opting to study the full text of the selected works later.

## 2.3. Content analysis

Out of a total of 984 scientific resources, 57 were selected to be used in the research development process. The focus of the topic of the digital divide in the EU related to EGD with the priority that “no person or place should be left behind” led the authors to the current form of the analysis, which led to relevant results for the development of the analysed topic.

## 3. Results

In addition to the narrative literature review, an analysis of the internet connectivity situation of EU households was conducted. The data was imported in the form of Excel files, processed to obtain a consistent format, and then transferred to Tableau Public 2021 3.0 for analysis (Tableau Public, 2021). The EU countries were targeted, with data for the period 2005-2020, given that some analyses covered the period 2005-2019, others 2012-2019 and 2009-2020, depending on available statistics. To carry out the analysis, the dimensions of the multidimensional data cube were taken into account, and it is presented in Table no. 1.

**Table no. 1. Dimensions of the multidimensional analysis cube**

Dimension	Explanation	Unit of measure
People who use their mobile devices to access the Internet on the move.	Individuals who use mobile devices to access the Internet on the move – Use of mobile devices via mobile or wireless connection: mobile phone (or smartphone), laptop (e.g. laptop, tablet, etc.), or another mobile device example, PDA, e-book reader) away from home or work.	The percentage of people.

Dimension	Explanation	Unit of measure
Level of Internet access – households	Percentage of households that have access to the Internet at home. All forms of internet use are included. The considered population is between 16 and 74 years old.	Percentage of households.
Reasons why there is no Internet access at home	Households without internet access at home because access costs are too high (telephone, etc.)	Percentage of households without internet access at home.

Source: data processed by the authors

### 3.1. Factors that determine the digital divide and the access to technology

The preceding steps led to a number of results, which are presented in the following two subsections. The first contains the nomination of the factors identified in the literature, the second concrete solutions to improve Internet access and digital literacy. The two subsections contribute to address the research topic in a broad way and provide the opportunity to develop the discussions as suggested by the authors.

#### *Factors that determine the digital divide*

- *Access to technology:* the distinction between the population that has access to technology and the population that does not has determined the appearance of the digital divide and can be classified according to criteria describing differences in terms of gender, age, income, education, social groups or geographical location (Eurostat, 2019). This topic has become very popular against the background of the pandemic COVID-19 (Aissaoui, 2021) because it counts access to technology and its use among the determinants of the digital divide that causes the development of the European information society. The fact that 20% of EU citizens have never used the internet and that only 18% of rural areas in the EU reach broadband speeds of 30 Mbps (European Commission, 2021b) compared to the European average of 76%, leads to an unequal distribution of access to internet-connected devices (Fox, 2019). Gaps in access and use of technology are a global concern, as evidenced by the fact that the United Nations General Assembly declared in 2016 that access to the Internet should be a basic human right (Sanders and Scanlon, 2021). In this way, everyone can belong to an information society, (Eurostat, 2019) where rural communities are connected regardless of distance and “no person or place being left behind”.

- *Education:* differing socioeconomic conditions in countries have “slowed the incorporation of technology into education” in developing countries (Zalat, Hamed and Bolbol, 2021) with the United Nations International Children's Emergency Fund reporting that more than one billion children worldwide lack access to digital education during the pandemic COVID-19 (UNICEF, 2020). Exclusion from online education has now become an extremely important issue that has implications and negative consequences that impact not only the digital divide, but society. For example, it is extrapolated that “students who are not digitally connected during the learning process will not be able to acquire skills relevant to the labour market”(Molala and Makhubele, 2021), which has a negative impact on socio-economic development and implicitly on the labour market, to an extent that is difficult to imagine today.

- *Gender*: the issue of women's inclusion in the digital society brings to light obvious gaps, particularly in online cohorts of professionals, which have a strong impact on inclusion in the information society and influence global sustainable development (Kashyap and Verkroost, 2021). Given that the EU targets gender equality, the digital divide is still significant, and women still lag men due to education, lack of training and unemployment (Kerras et al., 2020).

- *Income*: experts appreciate that income and education favour the adoption of digital technologies, with poverty being one of the main causes of disparities (Mubarak, Suomi and Kantola, 2020). Higher-income men are more likely to have access to the Internet, but over time gender and education differences become less important, so that income and cognitive ability prevail (Huxhold, Hees and Webster, 2020).

- *The generation in which a person was born*: regarding the effect of socio-demographic variables on the digital divide, it has been found that the generation in which a person was born is an important factor, and significant differences between generations X,Y,Z were identified (Dabija et al., 2017), but the level of education tends to be stronger than the effect of generation (Ertl, Csanadi and Tarnai, 2020). However, it cannot be ignored that the iGen (the first generation to reach adolescence after the proliferation of smartphones) is interacting less and less socially as digital media consumption increases. Students who started college in 2016 spent an hour less per day on social interactions. This has led to a sudden increase in feelings of loneliness among adolescents, an extremely important phenomenon to mention in the process of integration into an inclusive information society (Twenge, Spitzberg and Campbell, 2019).

- *Age and perception of age*: in addition to the above mentioned factors, interest in technology and marital status (Friemel, 2016) have a positive influence, but also the depreciation of cognitive, sensory and motor functions have a influence, but a negative one (Holgersson, Söderström and Rose, 2019). The digital divide leads to the formation of vulnerable groups, and at the EU level, such a group of older people with low levels of education and income has been identified as having negative attitudes towards digitalization and low internet use (Vasilescu et al., 2020). It is assumed that these people cannot take advantage of the digital society (Tavares, 2020). The stronger the negative perception of age, the less the Internet is used by older women compared to middle-aged women and men (Choi et al., 2020). Even if they have access to this technology, older people choose not to use it, especially due to prejudices such as “being too old to use it” (McDonough, 2020). To reduce the impact of this factor, studies show that the positive influence of the social context, encouragement from family and friends, but also professional training courses can contribute to positive long-term changes.

- *Social background, personal history and ability to use technology*: the lack of internet-enabled devices in low-income families limits children's development, especially those from rural areas. Family conditions and access to online education become determinants of the digital divide (Gu, 2021). Inequalities become more persistent as digital literacy increases, especially in light of the COVID-19 pandemic, which has led to a migration to the online environment even in areas with limited internet access (van Deursen and van Dijk, 2010; Molala and Makhubele, 2021). There are differences in the use of digital technologies and among school-age children based on social background, immigrant background and gender. However, immigrant boys with parents with higher education (who can provide educational resources) use digital technology more than girls born in EU

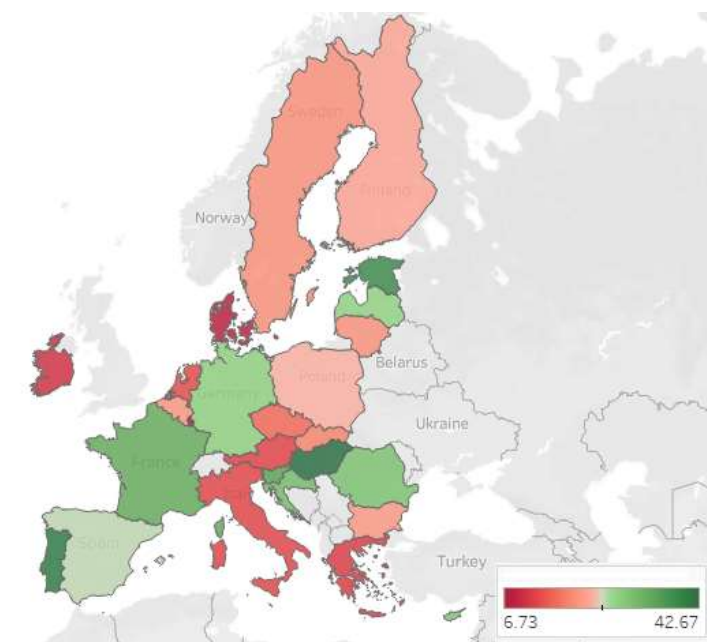


member states with less educated parents (Becker, 2021). The ability to use the Internet can improve academic performance, especially for students from families with low levels of education (Pagani et al., 2016; Surian and Sciandra, 2019), but the use of technology requires the possession of specific cognitive skills and knowledge that are essential for the use of ICT tools and services (Aissaoui, 2021), and their mastery is closely related to four categories of digital skills: operational, formal, informational and strategic (van Deursen and van Dijk, 2010).

- *People with disabilities*: is another vulnerable group that has emerged in the wake of technological development and require special attention in terms of education, support and improvement of legislation (Tomczyk et al., 2019) but not by treating them as a homogeneous group, but differentiated according to their diagnosis (Johansson, Gulliksen and Gustavsson, 2021). The same register includes people and places that are “left behind” in the process of “digital development” because they produce vulnerable groups that generate impacts with great influence on the developing information society.

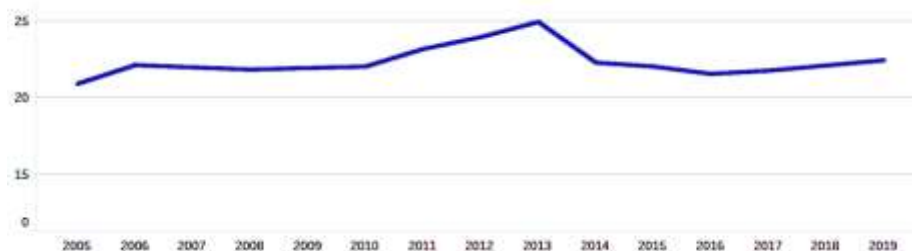
#### ***Analysis of EU households' access to technology***

At the level of the countries analysed, the most important factor associated with Internet access is its high cost. Figure no. 1 shows the map illustrating the average percentage of households without Internet access due to too high costs. The data analysed refer to the period 2005-2019 (Eurostat, 2021c).



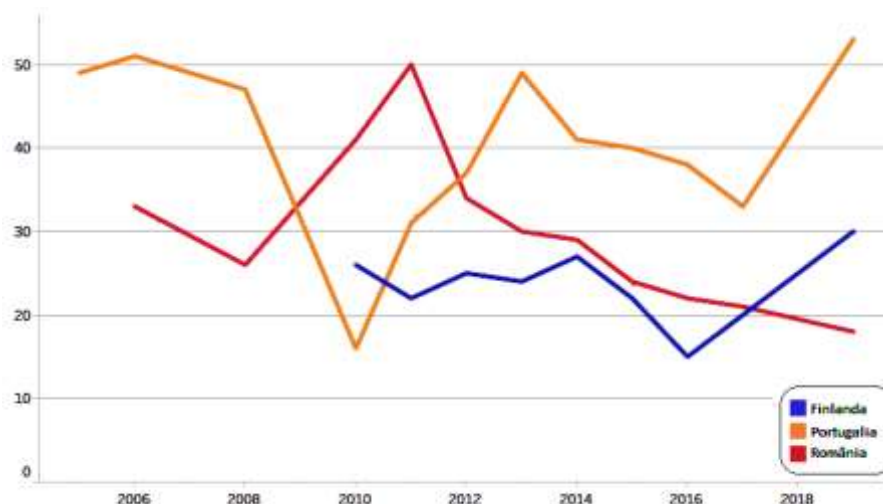
**Figure no. 1. Map – Share of EU households without access to the Internet due to high costs between 2005 and 2019 (%)**

The data collected between 2005 and 2019 allowed the construction of a graph showing, for the countries analysed, the evolution of the average proportion of households without Internet access due to excessive costs for all the countries analysed (Figure no. 2) (Eurostat, 2021c).



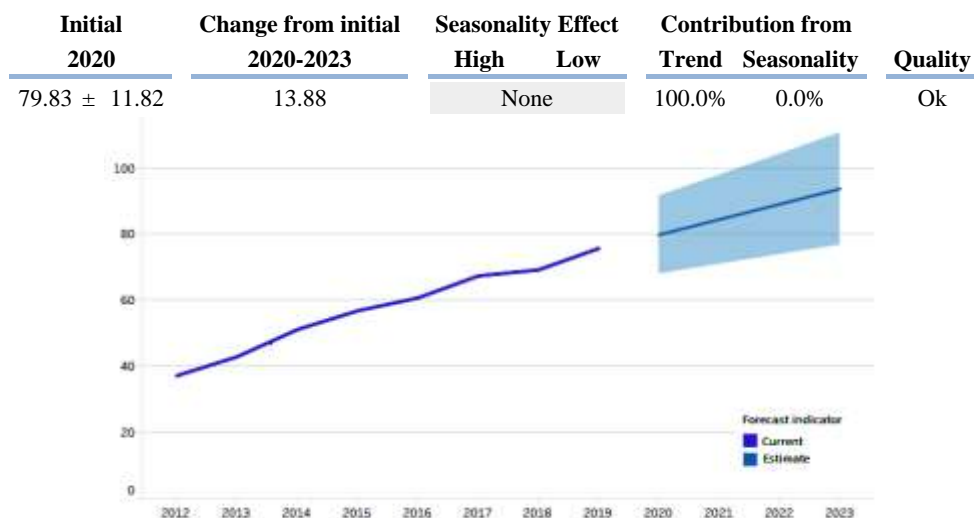
**Figure no. 2. Average share of countries analysed for households without Internet access, as access costs are too high between 2005 and 2019 (%)**

Figure no. 2 shows that the average at the level of the 27 countries analysed varies between 19% and 24% for households that do not have access to the home internet due to excessive access costs. There are countries like Romania where the indicator has dropped from 50% in 2011 to 18% in 2019. At the same time, there were significant increases in other countries, such as Finland, where the Internet access value increased from 15% in 2016 to 30% in 2019. or Portugal, which increased from 16% in 2010 to 53% in 2019 (see Figure no. 3) (Eurostat, 2021c).



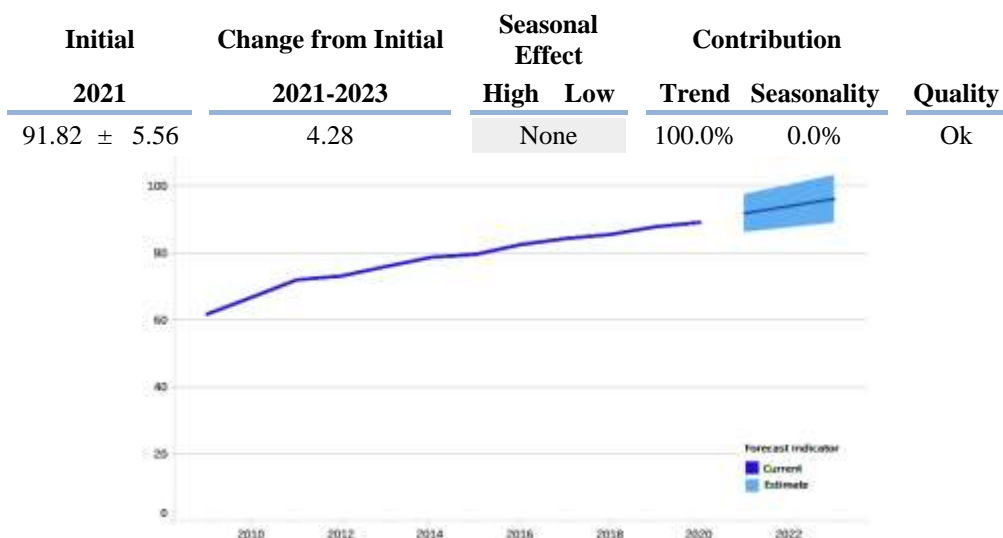
**Figure no. 3. Comparative evolution of the share of households without Internet access due to too high access costs between 2005 and 2019 (%)**

Regarding the people who use mobile devices to access the Internet on the move (Figure no. 4), a forecast was made based on the data collected in the period 2012-2019. Thus, forecasted value of 89.08% for 2022 and 93.71% for 2023 were obtained (Eurostat, 2021d). In order to generate a forecast, an annual non-seasonally adjusted time series was constructed using Tableau Public application based on data from 2012-2019 without ignoring periods, by taking into account the average share of people who use mobile devices to access the internet on the move. The forecast was generated for a period of 4 years (2020-2023).



**Figure no. 4. Forecast – The share of people using mobile devices to access the Internet on the move between 2020 and 2023 (%)**

A forecast analysis for the level of Internet access – households (Figure no. 5), based on data collected between 2009 and 2020, made it possible to obtain a possible value of 93.96% for 2022 and 96.10% for 2023 (Eurostat, 2021e). To make the forecast, an annual, non-seasonally adjusted time series (2009-2020) was used in the Tableau Public application, based on data from 2009-2020 without ignoring periods, by taking into account the average share of Internet access of households, obtaining a forecast for 3 years period of time (2021- 2023).



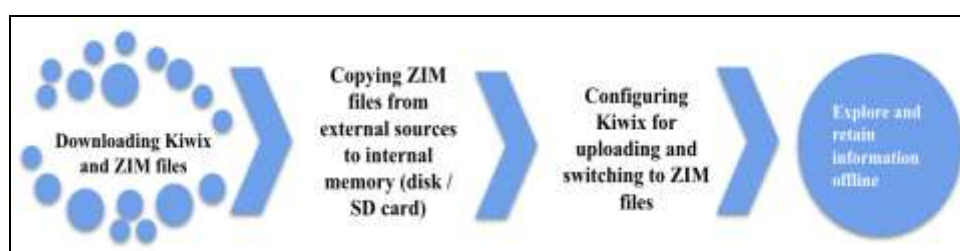
**Figure no. 5. Share of the level of Internet access – households between 2021 and 2023 (%)**

### 3.2. Solutions for digital divide mitigation

Linking concerns about narrowing the digital divide to EGD has led to the identification in the literature of appropriate examples of integration of digital immigrants and support for vulnerable groups that could threaten the development of the European information society, which are briefly presented in the next subsection.

#### *Kiwix Alternative Digital Library*

In the form of open-source software, Kiwix is a multiplatform that provides access to information for millions of users around the world. The project was launched in 2012 by Emmanuel Engelhart with the aim of digitally integrating developing countries. It currently runs on both Android, iOS, Windows, Mac OS and Linux and is designed to be used in remote areas without internet, with users accessing online web content via ZIM files. The functional mechanism of the platform is shown in Figure no. 6 (Kiwix, 2021).



**Figure no. 6.** The operating mechanism of the Kiwix platform (Dhungana, 2021, p.10)

#### *Open Learning Exchange (OLE)*

As an organization founded to extend learning solutions through *open-access* tools, OLE has launched a portable solution that is accessible to all through a learning staff kit called Planet Learning. It works offline, but also on the Internet, and the Raspbberri Pi is often used as a server. It can be powered locally by batteries and solar panels and is designed for community use. Planet Learning integrates a free resource repository with open access for all Linux, Apple, OS X or Windows users (Open Leaning Exchange, 2021).

#### *Distribution of information via portable flash drives and radio waves*

Examples of success in improving digital literacy and reducing the gap between rural and urban students include the actions of REED – NEPAL (2020), which worked both to educate girls during the COVID-19 pandemic through the “Quick Impact Project” and to reduce the negative impact of the lack of ICT devices in schools and at home by transmitting information via radio waves (Annapurna Express, 2021). Another solution to promote digital literacy is MOLEAP, a modular e-learning and assessment platform provided online for students without internet access in rural areas accessed via a laptop or PC, being launched via a USB stick running the Ubuntu operating system, and giving each user individual access (Hillier, 2017).

#### *Web Accessibility Initiative for People with Disabilities*

Barriers for people with disabilities to use the Internet can be removed through platforms such as [www.w3.org/WAI](http://www.w3.org/WAI) (WAI, 2021), which aim to help this vulnerable group access content specifically created with the help of professionals.

### 3.3. Discussion

The disparity in digital performance across EU countries revealed by the DESI index continues to raise concerns about the existing digital backwardness. The impact of inequalities between European citizens in this respect is so severe that action to mitigate the gap is urgently needed. Through a narrative review of published studies, the paper allows us to discover success storeys through which technology adoption, improving access to the internet and raising literacy levels are not impossible. Non-governmental organisations and agencies interested in enhancing the ability of rural communities to integrate into the information society by acquiring academic and life skills through radio education to close the gender gap (Annappurna Express, 2021) can promote their initiatives through the EGD calendar.

Avoiding the digital divide is a goal that must be considered in all its complexity, taking into account all three mentioned phases. The institutions involved in the mission to improve Internet access must not stand still but, on the contrary, contribute to the catalysis of 21<sup>st</sup> century education through digital literacy (Reddy et al., 2020), especially among digital immigrants (List, 2019). It is recommended to carry out a process of assimilation of digital knowledge synchronized with the generation in which a person/family was born (List, 2019). It is recommended to carry out a process of assimilation of digital knowledge synchronized with the generation in which a person/family was born (Ertl, Csanadi and Tarnai, 2020), socio-cultural factors, background and belonging to communities of information interest (Chipeva et al., 2018). In this way, all three perspectives of digital literacy are achieved, with individuals acquiring skills and competencies without which they cannot succeed in a changing society. The role of digital natives in the accelerated development of society is undeniable, but on the other hand, the differences between them and digital immigrants accentuate the challenges of the socio-digital revolution we are currently experiencing. The integration of the population that has not overcome the first stage to avoid the rupture, namely access to technology, is becoming more and more a controversial issue and EGD can be the solution to this challenge. Gender, education, income, social affiliation, and geographic disparities can be combated by governments adopting personalized policies for communities that produce vulnerable groups. They would promote the development of the information society with the phenomenon of digital literacy to prepare individuals for current and future jobs, thus facilitating living standards and the integration process.

If the different socio-economic conditions of countries have slowed down the incorporation of technology in education (Zalat, Hamed and Bolbol, 2021), ensuring quality data infrastructure between rural and urban areas would help to achieve both the goal of digital inclusion and avoid exclusion from online education and the difficult challenges that would be felt in the labour market in the long run (Molala and Makhubele, 2021). The lack of access to technology and the internet in homes and on the move further highlights the digital divide in the EU. Through the specific programs already mentioned, the initiatives proposed under the EGD would strengthen the EU's gender equality objectives, as from a digital perspective the gaps are still significant (Kerras, et al, 2020). Training, retraining, counselling and support for vulnerable women's communities would boost economic growth by creating jobs relevant to an information society, so that no female and low-income person would be "left behind". This register may also include groups of people with disabilities, people with negative perceptions of old age, or people with a history where their social background and ability to use technology does not allow them to integrate. In light of the above challenges, the digital exclusion of these individuals is a real challenge

for the transformation of society. Therefore, the authors propose to combine the model of EGD – to which all 27 member states have committed themselves by creating new opportunities for innovation, investment and jobs, with the aim of digitally transforming European society – with the problem of avoiding digital disruption in the EU.

## **Conclusions**

In terms of theoretical implications, the scientific novelty of the paper consists in reviewing the main determinants of the digital divide according to the literature in order to formulate solutions to avoid it in the context of EGD. The commitment of all EU member states to boost growth and ensure well-being gives the study a timely scientific contribution as well as the moral obligation of European citizens to respond to the EU initiative by actively contributing to the development of a transformative, digital and inclusive society.

Managerial contributions are not limited to the nomination of entities with which PVE priorities can be exercised and disseminated across the EU, but also seek to take into account the identified digital divide determinants in order to meet the challenges and take advantage of technological, economic, social, political, and legislative opportunities. These can be real opportunities for metropolitan agencies, businesses and, in particular, non-profit organizations to support vulnerable groups affected by the effects of digital exclusion. The aim is to benefit from an integration process by gaining access to the Internet and increasing digital literacy to meet the minimum employment standards relevant to an information society. On the other hand, universities and pre-university entities can be involved in the digital literacy process by improving the techniques and methods by which individuals' knowledge and skills can be acquired. Universities, schools, and educational centres can provide the infrastructure, curriculum, and environment conducive to digital inclusion of both the beneficiaries of the programs implemented and those already out of the educational process, by raising the standards for the development of digital immigrants.

A limit of this study is the method used, which is not direct research. The narrative nature of the literature review may highlight the subjectivity of the authors in conveying information to the readers. Another limit is the relatively small number of publications that went into the elaboration of the paper. Although the selected bibliography that formed the basis of the analysis lends relevance to the study, no care was taken to include works that depict the digital divide from its inception. Finally, the study is based on the authors' interpretation of the results obtained and requires completion through further quantitative research in order to increase the objectivity with which the research problem must be approached.

In the future, research directions should aim to conduct quantitative studies to analyse the attitudes and behaviour of people at risk of digital exclusion due to limited internet access. These can be complemented by an experimental study in which people considered at risk in the process of inclusion in an information society can benefit from a digital literacy program that allows tracking individuals and integrating them into the labour market to fill the appropriate positions in a digitally transformed society. Finally, starting from the results presented, a comparative study can be carried out to monitor the activity of natives and digital immigrants to ensure the transfer of information necessary for the integration process in a simple way in digital world.

## References

- Aissaoui, N., 2021. The digital divide: a literature review and some directions for future research in light of COVID-19. *Global Knowledge, Memory and Communication*, [e-journal] ahead-of-print. DOI: 10.1108/GKMC-06-2020-0075.
- Annapurna Express, 2021. *REED Nepal / Making most out of radio during pandemic*. [online] Available at: <REED Nepal | Making most out of radio during pandemic (theannapurnaexpress.com)> [Accessed 6 September 2021].
- Baumeister, R.F. and Leary, M.R., 1997. Writing Narrative Literature Reviews. *Review of General Psychology*, [e-journal] 1(3), pp. 311-320. DOI: 10.1037/1089-2680.1.3.311.
- Becker, B., 2021. Educational ICT use outside school in the European Union: disparities by social origin, immigrant background, and gender. *Journal of Children and Media*, [e-journal] pp.1-20. DOI: 10.1080/17482798.2021.1902359
- Bieză, K.E., 2020. Digital Literacy: Concept and Definition. *International Journal of Smart Education and Urban Society (IJSEUS)*, [e-journal] 11(2), pp.1-15.
- Chipeva, P., Cruz-Jesus, F., Oliveira, T. and Irani, Z., 2018. Digital divide at individual level: Evidence for Eastern and Western European countries. *Government Information Quarterly*, [e-journal] 35(3), pp.460-479. DOI: 10.1016/j.giq.2018.06.003.
- Choi, E.Y., Kim, Y., Chipalo, E. and Lee, H.Y., 2020. Does Perceived Ageism Widen the Digital Divide? And Does It Vary by Gender?. *The Gerontologist*, [e-journal] 60(7), pp.1213-1223. DOI: 10.1093/geront/gnaa066.
- Comisia Europeană, 2020. *Planul de acțiune pentru educația digitală 2021-2027 Resetarea educației și formării pentru era digitală*. [online] Available at: <[http://www.cdep.ro/afaceri\\_europene/CE/2020/COM\\_2020\\_624\\_RO\\_ACTE\\_f.pdf](http://www.cdep.ro/afaceri_europene/CE/2020/COM_2020_624_RO_ACTE_f.pdf)> [Accessed 6 September 2021].
- Comisia Europeană, 2021. *Pactul verde european*. [online] Available at: <[https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal\\_ro](https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_ro)> [Accessed 6 September 2021].
- Dabija, D.C., Băbuț, R., Dinu, V. and Lugoian, M.I., 2017. Cross-Generational Analysis of Information Searching Based on Social Media in Romania. *Transformations in Business & Economics*, [e-journal] 16(2), pp.248-270.
- van Deursen, A.J.A.M. and van Dijk, J.A.G.M., 2010. Measuring internet skills. *International journal of human-computer interaction*, [e-journal] 26(10), pp. 891-916. DOI: 10.1080/10447318.2010.496338.
- van Deursen, A. and van Dijk, J., 2011. Internet skills and the digital divide. *New Media & Society*, [e-journal] 13(6), pp.893-911. DOI: 10.1177/1461444810386774.
- van Deursen, A.J.A.M. and van Dijk, J.A.G.M., 2019. The first-level digital divide shifts from inequalities in physical access to inequalities in material access. *New Media and Society*, [e-journal] 21(2), pp.354-375. DOI: 10.1177/1461444818797082.
- Van Dijk, J. 2020. *The digital divide*. Cambridge, UK: Polity Press, p. 8
- Dhungana, T., 2021. *Digital Divide: An Overarching Issue*. DOI: 10.13140/RG.2.2.17241.03684.
- Ertl, B., Csanadi, A. and Tarnai, C., 2020. Getting closer to the digital divide: An analysis of impacts on digital competencies based on the German PIAAC sample. *International Journal of Educational Development*, [e-journal] 78(June), p. 102259. DOI: 10.1016/j.ijedudev.2020.102259.
- European Commission, 2019, *Communication from the Commission. The European Green Deal*, Available at: <<https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52019DC0640&from=ET#footnote4>> [Accessed 07 December 2021].
- European Commission, 2020. *Digital Economy and Society Index (DESI) 2020: Thematic*

- chapters. [online] Available at: <<https://ec.europa.eu/digital-single-market/en/desi>> [Accessed 15 September 2021].
- European Commission, 2021a. *Europe's Digital Decade: digital targets for 2030*. [online] Available at: <[https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age/europes-digital-decade-digital-targets-2030\\_en#international-partnerships-for-the-digital-decade](https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age/europes-digital-decade-digital-targets-2030_en#international-partnerships-for-the-digital-decade)> [Accessed 7 September 2021].
- European Commission, 2021b. *EU Digital Divide Infographic | Shaping Europe's digital future*. [online] Available at: <<https://digital-strategy.ec.europa.eu/en/library/eu-digital-divide-infographic>> [Accessed 15 Sep. 2021].
- Eurostat, 2019. *Glossary: Digital divide – Statistics Explained*. [online] Available at: <[https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Digital\\_divide](https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Digital_divide)> [Accessed 10 September 2021].
- Eurostat, 2021a. *Glossary: E-inclusion*. [online] Available at: <<https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:E-inclusion>> [Accessed 10 September 2021].
- Eurostat, 2021b. *European Statistical Recovery Dashboard*. [online] Available at: <<https://ec.europa.eu/eurostat/data/database>> [Accessed 20 September 2021].
- Eurostat, 2021c. *Reasons for not having internet access at home*. [online] Available at: <<http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=tin00026&lang=en>> [Accessed 20 September 2021].
- Eurostat, 2021d. *Individuals using mobile devices to access the internet on the move*. [online] Available at: <<https://ec.europa.eu/eurostat/databrowser/view/tin00083/default/table?lang=en>> [Accessed 20 September 2021].
- Eurostat, 2021e. *Level of internet access – households*. [online] Available at: <<https://ec.europa.eu/eurostat/databrowser/view/tin00134/default/table?lang=sv>> [Accessed 20 September 2021].
- Fox, P., 2019. *The global digital divide*. [online] Available at: <<https://www.khanacademy.org/computing/computers-and-internet/xcae6f4a7ff015e7d:the-internet/xcae6f4a7ff015e7d:the-digital-divide/a/the-global-digital-divide>> [Accessed 10 September 2021].
- Friemel, T.N., 2016. The digital divide has grown old: Determinants of a digital divide among seniors. *New Media & Society*, [e-journal] 18(2), pp.313-331. DOI: 10.1177/1461444814538648.
- Gu, J., 2021. Family Conditions and the Accessibility of Online Education: The Digital Divide and Mediating Factors. *Sustainability* [e-journal] 13(15), pp. 313-331. DOI: 10.3390/su13158590.
- Hillier, M., 2017. Bridging the digital divide with an off-line e-learning and e-assessment platform. *Open and Distance Learning Association of Australia*. [e-journal] pp.1-10.
- Holgersson, J., Söderström, E. and Rose, J., 2019. Digital Inclusion for Elderly Citizens for a Sustainable Society. In: *Proceedings of the 27th European Conference on Information Systems (ECIS)*. [online] Available at: <[https://aisel.aisnet.org/ecis2019\\_rip/7](https://aisel.aisnet.org/ecis2019_rip/7)> [Accessed 10 September 2021].
- Huxhold, O., Hees, E. and Webster, N.J., 2020. Towards bridging the grey digital divide: changes in internet access and its predictors from 2002 to 2014 in Germany. *European Journal of Ageing*, [e-journal] 17(3), pp.271-280. DOI: 10.1007/s10433-020-00552-z.
- Johansson, S., Gulliksen, J. and Gustavsson, C., 2021. Disability digital divide: the use of the internet, smartphones, computers and tablets among people with disabilities in Sweden. *Universal Access in the Information Society*, [e-journal] 20(1), pp.105-120. DOI: 10.1007/s10209-020-00714-x.
- Kashyap, R. and Verkroost, F.C.J., 2021. Analysing global professional gender gaps using



- LinkedIn advertising data. *EPJ Data Science*, [e-journal] 10(1). DOI: 10.1140/epjds/s13688-021-00294-7.
- Kerras, H., Sánchez-Navarro, J.L., López-Becerra, E.I. and de-Miguel Gómez, M.D., 2020. The impact of the gender digital divide on sustainable development: Comparative analysis between the european union and the maghreb. *Sustainability*, [e-journal] 12(8), pp.1-30. DOI: 10.3390/su12083347.
- Kiwix, 2021. *Internet. Offline*. [online] Available at: <<https://www.kiwix.org/en/>> [Accessed 10 September 2021].
- List, A., 2019. Defining digital literacy development: An examination of pre-service teachers' beliefs. *Computers and Education*, [e-journal] 138(March), pp.146-158. DOI: 10.1016/j.compedu.2019.03.009.
- McDonough, C.C., 2020. Determinants of a Digital Divide Among Able-Bodied Older Adults: Does "Feeling Too Old Play a Role?". *International Journal of Aging Research*, [e-journal] 3(2), p.60. DOI: 10.28933/ijoar-2020-02-2305.
- Molala, T.S. and Makhubele, J.C., 2021. The Connection Between Digital Divide and Social Exclusion: Implications for Social Work. *Humanities & Social Sciences Reviews*, [e-journal] 9(4), pp.194-201. DOI: 10.18510/hssr.2021.9427.
- Mubarak, F., Suomi, R. and Kantola, S.P., 2020. Confirming the links between socio-economic variables and digitalization worldwide: the unsettled debate on digital divide. *Journal of Information, Communication and Ethics in Society*, [e-journal] 18(3), pp.415-430. DOI: 10.1108/JICES-02-2019-0021.
- Noll, J., Dixit, S., Radovanovic, D., Morshedi, M., Holst, C. and Winkler, A.S., 2018. 5G network slicing for digital inclusion. In: *2018 10th International Conference on Communication Systems & Networks (COMSNETS)*, pp.191-197. DOI: 10.1109/COMSNETS.2018.8328197.
- Open Learning Exchange, 2021. *Our Platform* [online]. Available at: <<https://www.ole.org>> [Accessed 10 September 2021].
- Pagani, L., Argentin, G., Gui, M. and Stanca, L., 2016. The impact of digital skills on educational outcomes: evidence from performance tests. *Educational Studies*, [e-journal] 42(2), pp.137-162. DOI: 10.1080/03055698.2016.1148588.
- Plotichkina, N. V., Morozova, E. V and Miroshnichenko, I. V., 2020. Digital Technologies: Policy for Improving Accessibility and Usage Skills Development in Europe and Russia. *Mirovaia ekonomika i mezhdunarodnye otnosheniia*, [e-journal] 64(4), pp.70-83. DOI: 10.20542/0131-2227-2020-64-4-70-83.
- Prensky, M. 2001. Digital natives, digital immigrants part 2: Do they really think differently?. *On the horizon*, [e-journal] 9(6), pp.1-6. DOI: 10.1108/10748120110424843
- Reddy, P., Chaudhary, K., Sharma, B. and Chand, R., 2020. Digital Literacy: A Catalyst for the 21<sup>st</sup> Century Education. *2020 IEEE Asia-Pacific Conference on Computer Science and Data Engineering, CSDE 2020*, pp.1-6. [online]. DOI: 10.1109/CSDE50874.2020.9411548.
- Rodriguez-Hevíá, L.F., Navío-Marco, J. and Ruiz-Gómez, L.M., 2020. Citizens' involvement in e-government in the European Union: The rising importance of the digital skills. *Sustainability*, [e-journal] 12(17), 6807. DOI: 10.3390/SU12176807.
- Sala, E., Gaia, A. and Cerati, G., 2020. The gray digital divide in social networking site use in Europe: Results from a quantitative study. *Social Science Computer Review*, [e-journal] 4(3), pp. 1-9. DOI: 10.1177/0894439320909507.
- Salemink, K., Strijker, D. and Bosworth, G., 2017. Rural development in the digital age : A systematic literature review on unequal ICT availability , adoption , and use in rural areas. *Journal of Rural Studies*, [e-journal] 54, pp. 360-371. DOI: 10.1016/j.jrurstud.2015.09.001.

- Sanders, C.K. and Scanlon, E., 2021. The Digital Divide Is a Human Rights Issue: Advancing Social Inclusion Through Social Work Advocacy. *Journal of Human Rights and Social Work*, [e-journal] 6(2), pp.130-143. DOI: 10.1007/S41134-020-00147-9.
- Scheerder, A., Deursen, A. Van and Dijk, J. Van, 2017. Telematics and Informatics Determinants of Internet skills, uses and outcomes . A systematic review of the second- and third-level digital divide. *Telematics and Informatics*, [e-journal] 34(8), pp.1607-1624. DOI: 10.1016/j.tele.2017.07.007.
- Snyder, H., 2019. Literature review as a research methodology: An overview and guidelines. *Journal of Business Research*, [e-journal] 104, pp. 333-339. DOI: 10.1016/j.jbusres.2019.07.039.
- Surian, A. and Sciandra, A., 2019. Digital divide: Addressing internet skills. Educational implications in the validation of a scale. *Research in Learning Technology*, [e-journal] 27(1063519), pp.1-12. DOI: 10.25304/rlt.v27.2155.
- Tableau Public, 2021. *Your data has a story. Share it with the world.* [online] Available at: <<https://public.tableau.com/en-us/s/>> [Accessed 20 Sep. 2021].
- Tavares, A.I., 2020. Self-assessed health among older people in Europe and internet use. *International Journal of Medical Informatics*, [e-journal] 141, p.104240. DOI: 10.1016/j.ijmedinf.2020.104240.
- Tomczyk, Ł., Eliseo, M.A., Costas, V., Sánchez, G., Silveira, I.F., Barros, M.-J., Amado-Salvatierra, H.R. and Oyelere, S.S., 2019. Digital Divide in Latin America and Europe. In: *2019 14th Iberian Conference on Information Systems and Technologies (CISTI)*. pp.1-6. [online]. DOI: 10.23919/CISTI.2019.8760821.
- Tranfield, D., Denyer, D. and Smart, P., 2003. Towards a Methodology for Developing Evidence-Informed Management Knowledge by Means of Systematic Review. *British Journal of Management*, [e-journal] 14(3), pp.207-222. DOI: 10.1111/1467-8551.00375.
- Twenge, J.M., Spitzberg, B.H. and Campbell, W.K., 2019. Less in-person social interaction with peers among U.S. adolescents in the 21st century and links to loneliness, *Journal of Social and Personal Relationships*, [e-journal] 36(6), pp. 1892-1913. DOI: 10.1177/0265407519836170.
- UNICEF, 2020. *COVID-19: At least a third of the world's schoolchildren unable to access remote learning during school closures, new report says.* Available at: <<https://www.unicef.org/press-releases/covid-19-least-third-worlds-schoolchildren-unable-access-remote-learning-during>> [Accessed 10 September 2021].
- United Nations. 2015. *Transforming our world:the 2030 Agenda for Sustainable Development*. [online] Available at: <<https://sdgs.un.org/2030agenda>> [Accessed 10 December 2021].
- Vasilescu, M.D., Serban, A.C., Dimian, G.C., Aceleanu, M.I. and Picatoste, X., 2020. Digital divide, skills and perceptions on digitalisation in the European Union – Towards a smart labour market. *PLoS ONE*, [e-journal], 15(4), pp.1-39. DOI: 10.1371/journal.pone.0232032.
- WAI, 2021. *Making the Web Accesible*. [online] Available at: <[www.w3.org/WAI](http://www.w3.org/WAI)> [Accessed 10 September 2021].
- Yildiz, E.P., 2020. Opinions of academicians on digital literacy: A phenomenology study. *Cypriot Journal of Educational Sciences*, [e-journal] 15(3), pp. 469-478. DOI: 10.18844/cjes.v15i3.4913.
- Zalat, M.M., Hamed, M.S. and Bolbol, S.A., 2021. The experiences, challenges, and acceptance of e-learning as a tool for teaching during the COVID-19 pandemic among university medical staff. *PLOS ONE*, [e-journal] 16(3), p.e0248758. DOI: 10.1371/JOURNAL.PONE.0248758.