ENTREPRENEURSHIP AND SUSTAINABILITY ISSUES
ISSN 2345-0282 (online) http://jssidoi.org/jesi/
2021 Volume 9 Number 2 (December)
http://doi.org/10.9770/jesi.2021.9.2(24)

ENTREPRENEURSHIP AND SUSTAINABILITY CENTER

Publisher

http://jssidoi.org/esc/home

DIGITAL ECONOMY: TECHNOLOGICAL, ORGANIZATIONAL AND CULTURAL CONTEXTS FOR THE DEVELOPMENT OF COOPERATION IN EUROPE*

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Received 15 August 2021; accepted 3 November 2021; published 30 December 2021

Abstract. This study aims at assessing the influence of Digital Economy on socio-economic contexts in Europe. Specifically, the assessment of this relationship was developed by performing a statistical regression analysis and by considering, on the one hand, for digital aspects, the Digital Economy and Society Index (DESI), and on the other hand, four socioeconomic indexes (Social Progress Index, Corruption Perception Index, Global Innovation Index, Doing Business). The study measures the potential existence of a correlation between DESI and its dimensions and every of the four socio-economic indexes also evaluating the characteristics of those correlations. Additionally, the analysis identifies the foremost influential DESI dimensions to supply the digital leverage within which to focus so as to reinforce socio-economic position. The results showing the correlations and therefore the intensity between the variable considered, highlight the influence of a number of them because the most effective digital levers that European countries should address so as to aspire the achievement of satisfactory leads to the socio-economic context.

Keywords: digital economy; Europe; quantitative analysis; cooperation

Reference to this paper should be made as follows: Marino, A., Pariso, P. 2021. Digital economy: technological, organizational and cultural contexts for the development of cooperation in Europe. *Entrepreneurship and Sustainability Issues* 9(2), 363-383. http://doi.org/10.9770/jesi.2021.9.2(24)

JEL Classifications: L2, L26

1. Introduction

In the last twenty years, digital tools and in particular information and communication technologies (ICT) represented strategic pillars in the growth of the economic and social contexts. The high speed of technological innovations requires continuous and repeated changes to organizational (Marino et al., 2020), cultural, socio-economic, and political contexts. Such changes are no longer produced by an evolutionary innovation, that generates incremental advances in both technologies and processes (Garud et al., 2013) but, as in the case of digitization, the innovation is identified as disruptive (Vossen et al., 2017). This last kind of innovation brings deep changes and improvements that are different from previous ones (Li et al., 2018). Such kind of innovation brought deep changes in the business' patterns improving their long-term competitiveness, profitability, and

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* *As part of the Research Program V: ALERE – Università della Campania Luigi Vanvitelli, Italy*

ISSN 2345-0282 (online) http://jssidoi.org/jesi/
2021 Volume 9 Number 2 (December)
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growth (Fransman, 2014). The innovation has many social consequences: it improves the products and services provided by a business, guarantees its success and growth, and consequently the employment. Furthermore, innovation increases the infrastructural quality of the geographical areas, consequently improving the well-being of their communities (Capone et al., 2020).

Therefore, in an era characterized by phenomena of rapid obsolescence of goods and services, countries' ability to manage technological innovations becomes strategic, implementing adaptive behaviors concerning the changes that their external reference environment can produce (Hagsall et al., 2019). Digitization is one of the most influential drivers of innovation (Rachinger et al., 2019). In particular, digital innovation (Marino et al., 2021) represents a paradigm that offers the possibility of interaction without any temporal and territorial constraint, able to manage, even remotely, products and services, as well as to analyze and manage huge amounts of data on the economic markets.

Europe has always taken up the challenge of digitization change since 1994, with the Bangemann Report (1994), which placed the innovations determined by the Information and Knowledge Society at the center of the transformation processes (Burch, 2006). Digital innovation was identified as a fundamental driver of market development because it was able to address 3 fundamental challenges in Europe at that time: poor innovation, slow growth, high unemployment. These issues were addressed and deepened in the Lisbon 2000 agenda in which the use of information technologies and the Internet were represented as an essential tool to improve the quality of government actions and consequently the quality of services for citizens and businesses (Di Martino et al, 2019). More recently, the European Commission launched in March 2010, the Europe 2020 strategy to emerge from the economic crisis and prepare the EU economy for the challenges of the next decade. One of the seven flagship initiatives of the Europe 2020 strategy is the Digital Agenda for Europe and aimed at establishing the key role of the digital economy in achieving the goals set for 2020 (European Commission, 2010). The European Digital Agenda identifies more than 100 actions to be implemented by the European Commission or by the individual Member States, and these actions are grouped into 7 main areas of intervention. Amongst these areas of intervention, there is the achieving of the Digital Single Market, identified by the European Commission (2017) as a strategic tool in the implementation of European digital growth that could contribute €415 billion per year to the EU economy and allow the creation of hundreds of thousands of new jobs. In the implementation of digitization processes, the disparities between European countries' capacities should be considered when devising and implementing future policies. In fact, during the last decade, each European country implemented differently, and at a different level, the designed digital political strategies. This different level of implementation in the digital policies countries consequently created great differences amongst them, producing the phenomenon of the digital divide (Marino et al., 2021). As discussed by the European Parliament in December 2015, reducing the digital divide between and within the European countries may raise EU Gross Domestic Product (GDP) by 1-1.5%. The creation over the last few years of a very heterogeneous digital European scenario has stimulated the European Union to identify the reduction of the digital divide and the need to measure the level of digitization of the Member States as strategic objectives for the EU Member States (Pérez-Morote et al., 2020). In line with this assumption, the different operative levels of digitization policies are affected by their economic and social contexts in terms of economic growth and social well-being (Park and Choi, 2019). Although many authors have focused on highlighting the importance of ICT on the economic and social development of countries, there are not many studies in the literature that evaluate this relationship through an approach based on the measurement of each of these aspects.

This study tries to create an accumulation of knowledge on this topic, assessing the influence of digitization on the socio-economic contexts in Europe. In particular, the assessment of this relationship has been elaborated considering, on the one hand, for the digital aspects the Digital Economy and Society Index (DESI) that represents the EU tool to measure the EU Member States digital performances. On the other hand, six socio-economic indexes (Social progress Index, Corruption Perception Index, Global Innovation Index, Doing Business, have been identified.

In line with the scope of the paper, we measure the existence and the eventual characteristics of a correlation between DESI and each one of the four socio-economic indexes and thus evaluate the validity of the hypothesis. Furthermore, we identify the most influencing DESI dimensions, to provide a set of digital leverage in which invest to improve the socio-economic position.

This relationship between these two aspects (digital and socio-economic) has been analyzed with a statistical model that measures, through a linear regression model, the correlation level between the considered variables. The statistical model pointed out an EU digital scenario evaluating which digital leverages could better influence the social well-being and economic growth in the European context. Finally, the study elaborated a comparative analysis of the EU28 Member States' performances based on their digital and socio-economic improvements in the period 2016-2018 to validate the results on a statistical approach.

The paper is organized as follows: Section two outlines the conceptual background on the topic of the study. Moreover, Section 3 explains the elaborated methodology, and Section 4 displays the results and related discussion. Finally, Section 5 shows the conclusions of the paper.

2. Theoretical background

Digitization is key factor for the economic growth of the countries (Evangelista et al., 2014) that to create efficient digitization development processes needs to simultaneously consider several different aspects (Vironen & Kah, 2019). Several authors emphasized the different factors that contribute to enhancing digitization processes. Toader et al. (2018) elaborated a study aimed at identifying and evaluating the effectiveness of using ICT infrastructure on economic growth in the European Union (EU) countries. Furthermore, assessing the digital development of Romanian enterprises, Martin et al. (2013) underlined the role of human capital as one of the major factors of influence in enterprise digitization. Castellacci & Tveito (2018). developed a survey focusing on the main four channels that can shape well-being in everyday life (The change of time use patterns, the creation of new activities, they facilitate access to information, and acts as a powerful communication tool). They showed how these four channels impact well-being in distinct domains of life, underlining why the use of the Internet has diverse effects on individuals and social groups. Moreover, designing a quantitative study based on former qualitative research to prove main drivers of successful digitization aspects, Reichstein et al. (2018) conducted interviews with European experts to give empirical evidence of six factors (efficiency, innovation, data privacy, mobility, new business models and human integration) in influencing of the potential value of digitization in business. Finally, Lindgren et al. (2019) presented a review and discussion aimed at identifying how the digitalization of public services has affected the interaction between citizens and government and how this process can influence the development of society.

Besides, the digitization processes and in particular the ICT tools are extremely interconnected with several socio-economic aspects. They also increase social well-being contributing to the enhancement of social progress and the reduction of the digital divide on individuals and social groups (Büchi et al., 2018). Moreover, the digital tools can help the government in the contrast of the corruption improving the transparency of public actions, the monitoring of tax systems, the enhancement of the interaction between citizens and public administration (Fanea-Ivanovici et al., 2019). Some European countries have more benefit from digitization because they paid more attention to innovations and digital business environments. During the last years, these countries shifted their research activities from innovation systems to technological innovation systems.

At the macro level (Marino et al., 2021), the effects of digitization are not easily identifiable because normally the economic growth of a country is measured with national output in terms of Gross Domestic Product (GDP) (Degryse, 2016). Moreover, many studies focused on measuring and quantifying the digital divide (Vicente and Lopez, 2006; Billon et al, 2010; Vicente & López, 2011; Chetty et al., 2018). The multi-dimensional character of the digital divide has led to the creation and analysis of different ICT indexes. Hence the need to measure digital performance (Brynjolfsson, & Collis, 2019), evaluating the implementation level of the digital economy (Kehal & Singh, 2005), as well as the need to clearly understand the effects of ICT on the socio-economic path of the countries (Park & Choi, 2019). In this context, it is interesting to note that some public Institutions (OECD, European Commission, UNCTAD, World Bank) have drowned their attention in the elaboration of measuring models of the Digital economy (OECD, 2020)

3. Research objective and methodology

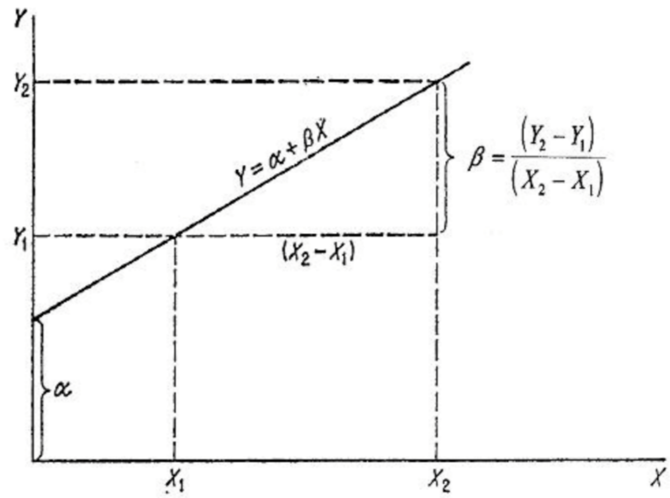
To evaluate if the digital performance of the EU Member State is correlated with their socio-economic conditions and how is when exists this correlation, the study elaborates a statistical model with a correlation analysis between indexes that includes both digital and socio-economic aspects. The model is also aimed at identifying which digital levers are most influential on the socio-economic performances.

Concerning the digital aspects, the study identifies DESI - Digital Economy and Society Index that is the tool adopted by the European Commission since 2014 to measure the degree of digitization of the digital economy and society of the various member countries of the Union and to follow its evolution over time. This composite index is composed of five dimensions: Connectivity, Human Capital, Use of Internet Services, Integration of Digital Technology, Digital Public Services.

In the assessment of the socio-economic contexts of the countries, the analysis includes four indexes. Two of these are more strictly linked to social aspects (Social Progress Index and Corruption Perception Index) and the other two are more respondents to the need of evaluating the economic conditions of the Member States (Global Innovation Index and Doing Business). In particular, Social Progress Index (SPI), elaborated by Social Progressive Imperative, evaluates the social and environmental performance of the various countries. It measures the capacity of a state to provide for the social and environmental needs of its citizens. Corruption perception Index (CPI) This index is the most used indicator of corruption worldwide. Each year, it scores countries "on how corrupt their public sectors are seen to be", by measuring the perceived level of public sector corruption worldwide, on the base of expert opinion. It is published (starting from 1995) by Transparency International, an international non-governmental organization that has the purpose of fighting corruption. Global Innovation Index (GII) is a yearly index that ranks countries by their capacity for and success in innovation and, thus, it provides a rich dataset to analyze the global innovation trends. GII aims to capture the multi-dimensional facets of innovation and provides tools that can assist in tailoring policies to promote long-term output growth, improved productivity, and job growth. It is co-published by INSEAD (a famous graduate business school) the WIPO-World Intellectual Property Organization (a specialized agency of the United Nations) and Cornell University (US, NY), in partnership with other organizations, starting from 2008. It is based on both subjective and objective data derived from several sources. Doing Business (DB) measures the capabilities of the 190 countries analyzed in creating business. A high ease of doing business ranking means the regulatory environment is more conducive to the starting and operation of a local firm. The rankings, published by The World Bank starting from 2014, are determined by sorting the aggregate distance to frontier scores, which benchmarks economies concerning regulatory best practice, showing the absolute distance to the best performance on each Doing Business indicator.
Normalization was carried out for each index; it was performed using the min-max method, which consists of a linear projection of each index on a scale between 0 and 1:

$$z = \frac{x - \min(x)}{\max(x) - \min((x)}$$

Starting in the hypothesis testing we verify if is the existence of a linear relation between the DESI and the four different indexes, which can be described through a linear regression model (Figure 1):



$$y = a + bx$$

Figure 1. Linear regression model

where x is DESI and y the given socio-economic indicator.
Furthermore, the hypothesis has to be verified also in the correlation between the 5 sub-dimensions of DESI (Connectivity, Human Capital, Use Of Internet, Integration Of Digital Technology, Digital Public Services) and the given socio economic indicator.

The statistical validation of the model is made through the use of Pearson Coefficient (PCC or r) to evaluate the existence of the linear correlation between the variable.

$$r = \frac{Cov_{xy}}{s_x s_y}$$

The values of the coefficients range between -1 and 1. The closer the value of r gets to zero, the lower is the correlation, while the closer to 1 or -1, the higher is the correlation. We assume in line with literature (Asuero et al., 2006) that the relationship is considered a:
- Strong correlation: 0.5 to 1.0 or -0.5 to 1.0.
- Moderate correlation: 0.3 to 0.5 or -0.3 to .5.
- Weak correlation: 0.1 to 0.3 or -0.1 to -0.3.

Moreover, the study analyses the values of Coefficient of Determination to evaluate how differences in one variable can be explained by a difference in a second variable and it gives you an idea of how many data points

ISSN 2345-0282 (online) http://jssidoi.org/jesi/
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fall within the results of the line formed by the regression equation. It is calculated as a ratio between residual sums, in the case of linear regression it corresponds with the square of the Pearson Coefficient ($R^2 = r^2$). Hence, it can define how strong is the model obtained through linear regression. It assumes values from 0 to 1. The higher the coefficient, the higher percentage of points the regression line passes through. From the literature, we will consider the model and the intensity of correlation as acceptable if the coefficient is at least$R^2 > 0,4$ (Kvålseth, 1985).

To validate that the hypothesis formulated is confirmed and to verify if the proposed regression model fits well with the data, the study applies a Student's T-test and a Fischer F-test respectively. In our case, we will reject the hypothesis (and therefore we will confirm the correlation) if the p-value of the t-Student test on the coefficient b is significantly lower than 0.01 by at least two other decimal places (Snedecor & Cochran, 1980). Moreover, we assume that the model fits well when the value of F is significantly greater than 10 taking into account the critical values of the distribution of F indicated in the table taking into account the alpha value, the sample size, and the degrees of freedom (Snedecor & Cochran, 1980). The collected data were statistically analyzed using the Statistical Package for the Social Sciences (SPSS) version 26.0.

The study to identify the digital levers more influent on socio-economic indexes. It first identifies the PCC value and then evaluates the value of the coefficient b (slope of the regression line) considering that the evaluation of the influence of the independent variable on the dependent one implies identifying how much a digital improvement is connected to an improvement in a given socio-economic index.

Finally, to validate the statistical model, based on the study carries out a comparative analysis identifying the top 5 countries that show the greatest delta in terms of improvements in digital performance (i.e. DESI and its dimensions) and socio-economic, and vice versa, the 5 countries that show the minor delta in terms of improving both digital and socio-economic performance. By this definition, we mean the five countries that achieved this best and/or worst performance in the period 2017-2019.

The aim is to check whether major and minor socio-economic improvements belong to major and minor digital improvements respectively.

4. Results and Discussion

In this section, for each of the four socio-economic indexes, their relationship with the DESI and its dimensions have been analyzed separately. The analysis starts by taking into consideration the social context through the assessment of the correlation with the Social Progress Index (SPI) and, subsequently, with the Corruption Perception Index (CPI). The analysis on the relationship of the economic context will then follow, through the assessment of the correlation with the Global Innovation Index (GII) and with the Doing Business (DB) (Figures 2,3,4,5,6).

It should be noted that one of the research outputs is to highlight any correlations and consequently identify their main characteristics, both concerning DESI, as a composite index, and concerning its individually identified dimensions.

Social Progress Index

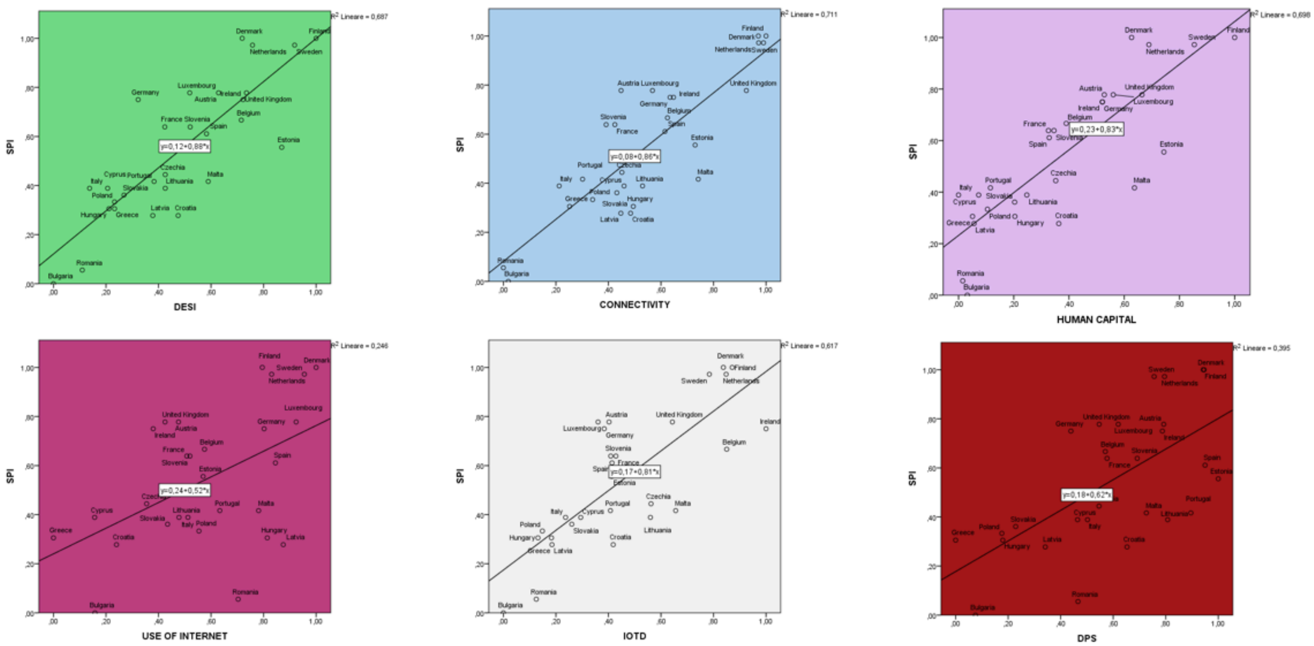

Figure 2. DESI vs SPI

Source: Our elaboration

Table 1. DESI vs SPI

Regression Statistic						
	DESI vs SPI	*Conn. vs SPI*	*HC vs SPI*	*UoI vs SPI*	*IoDT vs SPI*	*DPS vs SPI*
Correlation	0,828655369	0,843403705	0,835585864	0,495728612	0,785228525	0,628693362
Determination	0,686669721	0,71132981	0,698203737	0,245746857	0,616583837	0,395255343

	F	*p-value*
DESI vs SPI	56,97953222	0,0000000517
Conn. vs SPI	64,06818462	1,75134E-08
HC vs SPI	60,15083479	3,14838E-08
UoI vs SPI	8,471185489	0,007305065
IoDT vs SPI	41,81143446	0,00000075
DPS vs SPI	16,99335214	0,000339621

b Coefficient	*lower 95%*	*upper 95%*

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DESI vs SPI	0,878016226	0,638923258	1,117109193
Conn. vs SPI	0,858433107	0,637983692	1,078882522
HC vs SPI	0,830063153	0,610067547	1,05005876
UoI vs SPI	0,522707322	0,153551103	0,89186354
IoDT vs SPI	0,808894484	0,551755431	1,066033538
DPS vs SPI	0,623797587	0,312749265	0,934845909

Source: Our elaboration

Corruption Perception Index

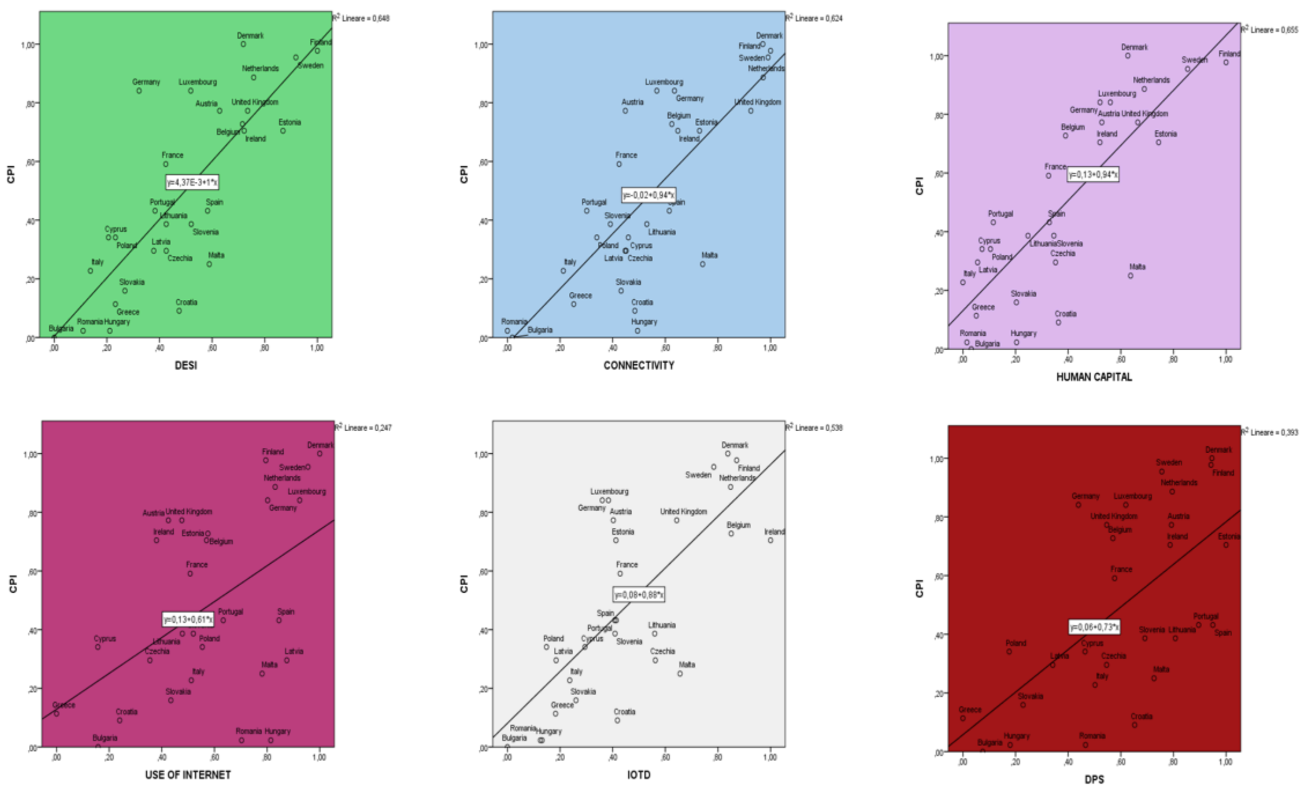

Figure 3. DESI vs CPI

Source: Our elaboration

Table 2. DESI vs CPI

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Regression Statistic						
	DESI vs CPI	*Conn. vs CPI*	*HC vs CPI*	*UoI vs CPI*	*IoDT vs CPI*	*DPS vs CPI*
Correlation	0,804749584	0,789703445	0,809543494	0,496597362	0,733388115	0,62655288
Determination	0,647621893	0,623631531	0,655360668	0,24660894	0,537858128	0,392568511

	F	*p-value*
DESI vs CPI	47,78437955	2,44142E-07
Conn. vs CPI	43,0812385	5,84591E-07
HC vs CPI	49,44118619	1,8195E-07
UoI vs CPI	8,510629861	0,007187203
IoDT vs CPI	30,25977987	9,00602E-06
DPS vs CPI	16,80318105	0,000360817

	b Coefficient	*lower 95%*	*upper 95%*
DESI vs CPI	0,995565145	0,699525136	1,291605154
Conn. vs CPI	0,938459027	0,64456218	1,232355874
HC vs CPI	0,938945895	0,66446013	1,213431661
UoI vs CPI	0,611363259	0,180596498	1,042130021
IoDT vs CPI	0,88208412	0,552473783	1,211694456
DPS vs CPI	0,725843306	0,361868919	1,089817693

Source: Our elaboration

Global Innovation Index

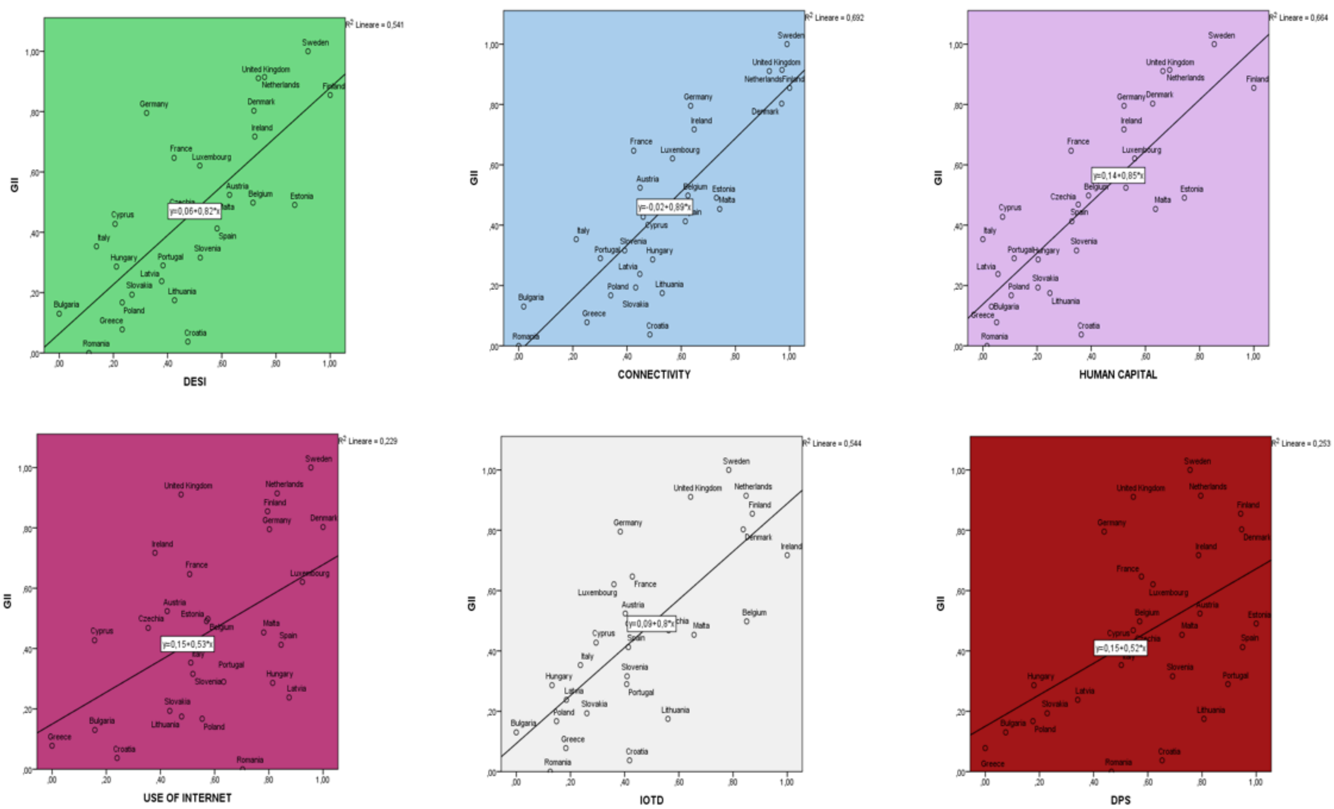

Figure 4. DESI vs GII

Source: Our elaboration

Table 3. DESI vs GII

Regression Statistic						
	DESI vs GII	*Conn. vs GII*	*HC vs GII*	*UoI vs GII*	*IoDT vs GII*	*DPS vs GII*
Correlation	0,735216072	0,831631891	0,815102037	0,478878013	0,73762337	0,502679706
Determination	0,540542672	0,691611602	0,664391331	0,229324152	0,544088236	0,252686887

	F	*p-value*
DESI vs GII	30,58849782	0,00000833
Conn. vs GII	58,30926764	4,18739E-08
HC vs GII	51,4711812	1,28046E-07
UoI vs GII	7,736622288	0,009934928
IoDT vs GII	31,02857891	7,51094E-06
DPS vs GII	8,791307074	0,006406108

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	b Coefficient	*lower 95%*	*upper 95%*
DESI vs GII	21,93755683	13,78426692	30,09084674
Conn. vs GII	0,886123966	0,647590461	1,124657472
HC vs GII	0,847665336	0,604799707	1,090530965
UoI vs GII	0,528605757	0,137962896	0,919248619
IoDT vs GII	0,795468282	0,501929407	1,089007158
DPS vs GII	0,52214192	0,160161118	0,884122722

Source: Our elaboration

Doing Business

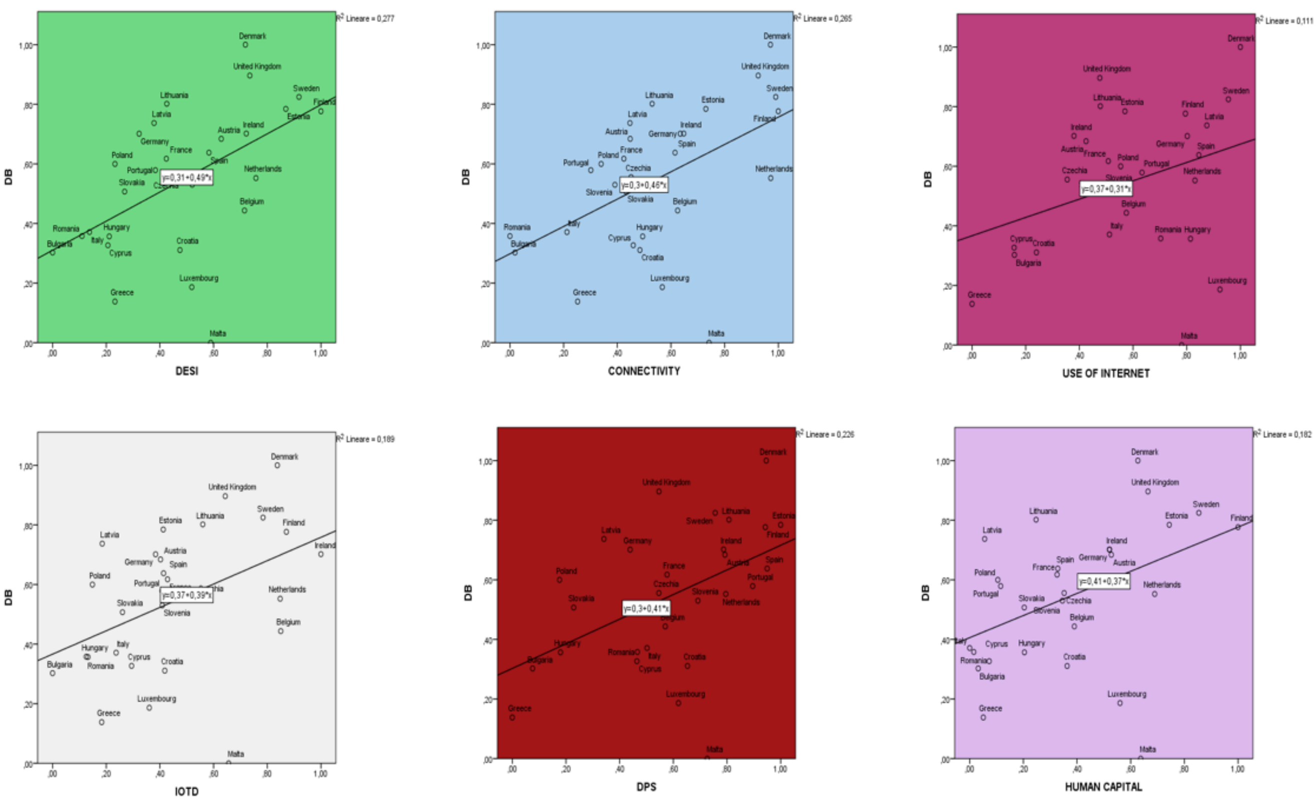

Figure 5. DESI vs DB

Source: Our elaboration

Table 4. DESI vs DB

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Regression Statistic						
	DESI vs DB	*Conn. vs DB*	*HC vs DB*	*UoI vs DB*	*IoDT vs DB*	*DPS vs DB*
Correlation	0,526224679	0,514439641	0,426426247	0,33285037	0,43451372	0,47525313
Determination	0,276912412	0,264648145	0,181839344	0,11078937	0,18880218	0,22586554

	F	*p-value*
DESI vs DB	9,956916484	0,00402236
Conn. vs DB	9,357223638	0,005098142
HC vs DB	5,778599724	0,023645878
UoI vs DB	3,239416575	0,083501901
IoDT vs DB	6,051368028	0,020858802
DPS vs DB	7,585896729	0,010593723

	b Coefficient	*lower 95%*	*upper 95%*
DESI vs DB	0,154791706	0,17025985	0,806617668
Conn. vs DB	0,458686223	0,15046262	0,766909825
HC vs DB	0,371085764	0,053773624	0,688397905
UoI vs DB	0,30744962	-0,043677409	0,658576649
IoDT vs DB	0,392111535	0,064464278	0,719758792
DPS vs DB	0,41308566	0,104795008	0,721376313

Source: Our elaboration

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Doing Business without outliers

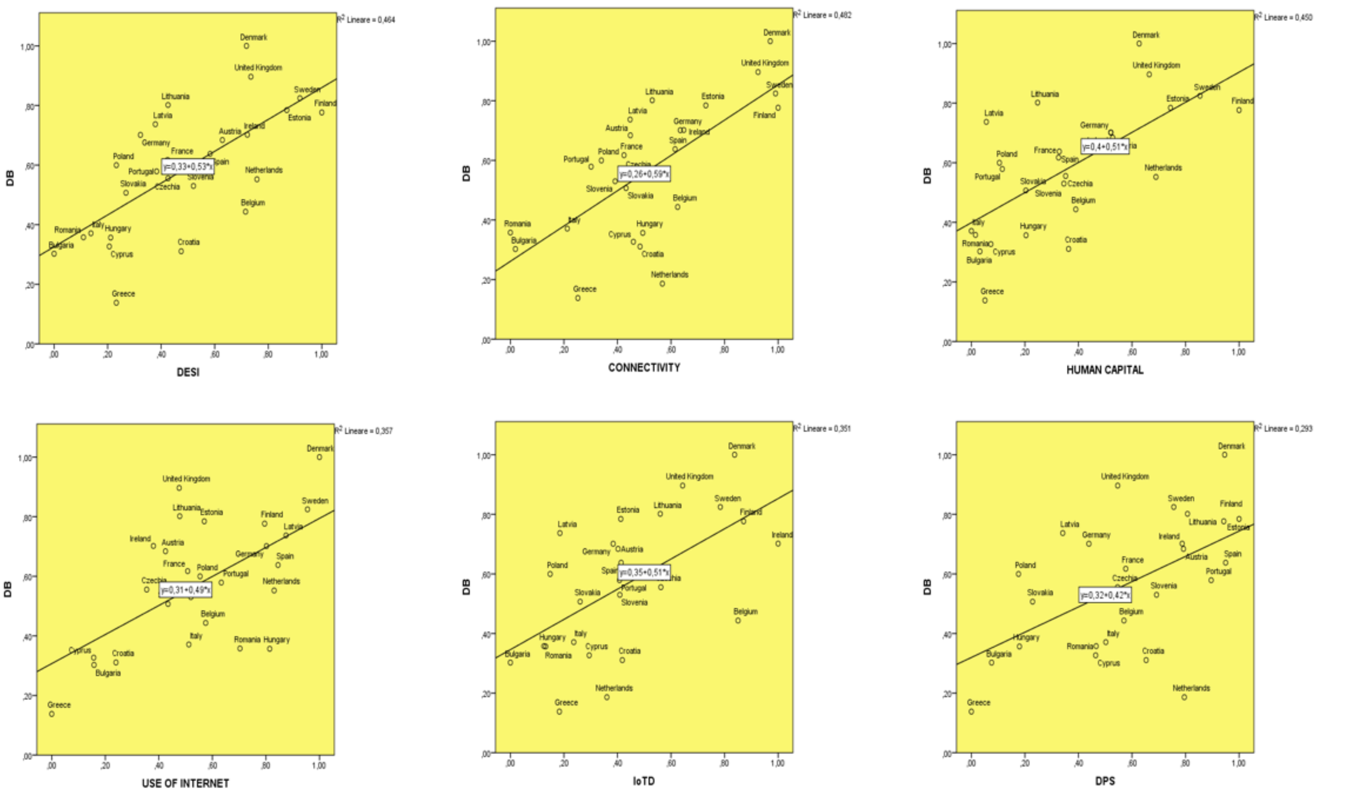

Figure 6. DESI vs DB without outliers

Source: Our elaboration

Table 5. DESI vs DB without outliers

Regression Statistic						
	DESI vs DB	*Conn. vs DB*	*HC vs DB*	*UoI vs DB*	*IoDT vs DB*	*DPS vs DB*
Correlation	0,681071405	0,694185912	0,694185912	0,597541237	0,592415441	0,541472735
Determination	0,463858258	0,48189408	0,48189408	0,35705553	0,350956055	0,293192723

	F	*p-value*
DESI vs DB	20,76428179	0,000128184
Conn. vs DB	22,32257434	8,3629E-05
HC vs DB	19,65973665	0,000175218
UoI vs DB	13,32826259	0,001266773
IoDT vs DB	12,97746537	0,001428957
DPS vs DB	9,955507787	0,004279409

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	b Coefficient	*lower 95%*	*upper 95%*
DESI vs DB	0,534209403	0,292250605	0,776168202
Conn. vs DB	0,592501492	0,333676828	0,851326155
HC vs DB	0,505057261	0,269964033	0,740150489
UoI vs DB	0,487351983	0,211837575	0,762866391
IoDT vs DB	0,506939475	0,216504095	0,797374855
DPS vs DB	0,424079377	0,146681078	0,701477675

Source: Our elaboration

From the regression analysis implemented, a general framework emerges in which the correlations are all positive, therefore the model obtainable through linear regression assumes that on average an improvement of 1 decimal point of the digital variables translates into an increase in the socio-economic indices corresponding to the value of coefficient b. In this context the most correlated measures are the Social Progress Index in particular for the digital variables DESI (r = 0.828; r2 = 0.686), Connectivity (r = 0.843; R2 = 0.711), Human Capital (r = 0.835; R2 = 0.698), and Digital Technology (r = 0.785; R2 = 0.611). Moreover, also the Corruption Perception Index displays a strong correlation for the digital variables DESI (r = 0.04; r2 = 0.647), Connectivity (r = 0.789; R2 = 0.623), Human Capital (r = 0.809; R2 = 0.655), and Digital Technology (r = 0.733; R2 = 0.537) as shown in fig. n. 2 and fig. n. 3.

The least correlated measure appears to be Doing Business for which there are levels of correlation that are acceptable but lower than the other socio-economic indices considered. In particular, the best correlations for this index emerged for the digital variables DESI (r = 0681; r2 = 0.463), Connectivity (r = 0.694; R2 = 0.481), Human Capital (r = 0.694; R2 = 0.481). It should be noted that for this socio-economic index the regression analysis in the first instance highlighted the lack of correlation for all digital variables Fig. 5. Starting from the analysis of the results and the dispersion graphs, the presence of critical values for Malta and Luxembourg emerged in all correlations (fig.5). The CPI also includes, within its methodology, the territorial extension of the countries among its components, and therefore countries that have a smaller territorial extension could be penalized in terms of performance for the Doing Business and consequently also for its correlation. In light of these results, the regression analysis was processed again by eliminating the outliers showing the results above mentioned and shown in Figure 6 and Table 5.

The p-value and F values for all digital variables (Tables 1, 2, 3, 4, 5) confirmed the suitability of the regression and model. Correlation/Ranking is presented in Figure 7 below.

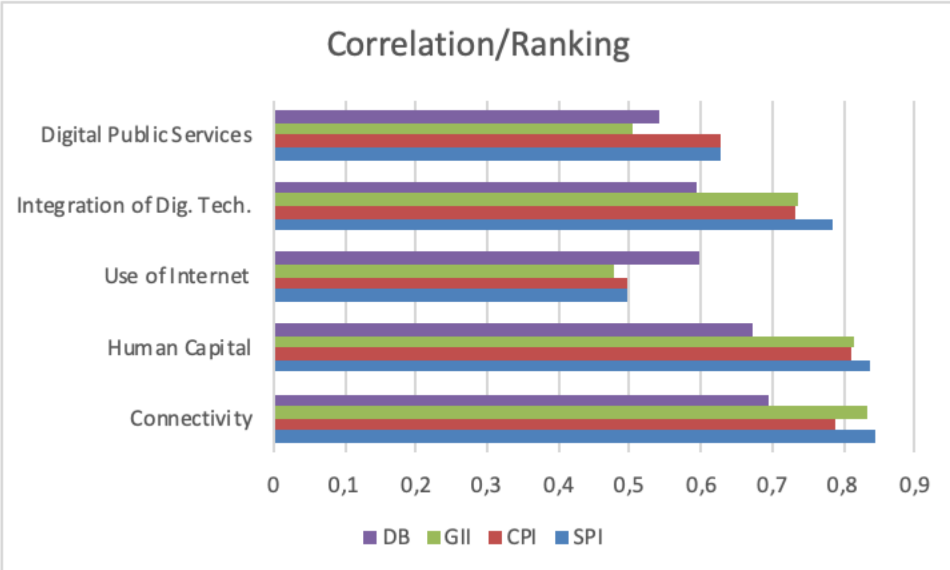

Figure 7. Correlation/Ranking

Source: Our elaboration

Changing the analysis perspective and evaluating the most influential digital levers, the results show that the three dimensions that express a greater leverage effect on socio-economic indices are Connectivity, Human Capital, and Integration of Digital Technology. This could mean that these dimensions represent the drivers on which the Member States, according to the statistical model, should invest more to accelerate and increase their socio-economic development. Therefore, the reduction of any digital divide concerning these results could be reduced through investments aimed at the development of citizens' digital skills, the creation of infrastructures with a high level of digitization, and the improvement of existing ones to bring them in line with the development. evolution of digital technological innovations and facilitate the digitalization process of companies.

ISSN 2345-0282 (online) http://jssidoi.org/jesi/
2021 Volume 9 Number 2 (December)
http://doi.org/10.9770/jesi.2021.9.2(24)

Comparative analysis

Figure 8. Comparative Analysis

Source: Our elaboration

The comparative analysis between the countries that show the lowest performance in terms of improvement in the period considered highlights a scenario in which there are countries that, in the face of a low delta in terms of digital performance, express in analogy, at least partially, a low also in socio-economic terms (Figure 8). The reasons behind these results differ according to the country analyzed. The presence of countries such as Denmark (Use of Internet 0.03; Digital Public Services 0.10; Social Progress Index 0.10; Global Innovation Index 0.01), Netherlands (DESI 0.01; Human Capital 0.01; Doing Business 0.07) and Sweden (Integration of Digital Technology 0.08; Digital Public Services 0.01; Social Progress Index 0.10) is attributable to the fact that these Member States rank in absolute terms on performance levels both digital and socio-economic very high and therefore the increases in terms of improvement over the last few years are very low. On the contrary, the presence in this context of countries such as Bulgaria (DESI 0.06; Human Capital 0.06; Corruption Perception Index 0.06; Doing Business 0.04) and Latvia (Human Capital 0.03; Use of Internet 0, 01; Social Progress Index 0.07; Doing Business 0.04) highlights the difficulty of follower countries in the European context that are not able to reduce the distance from the best countries both in digital terms and in terms of economic growth and social well-being.

In line with what is shown in the comparison between the "worst" countries, the data relating to the comparative analysis between the countries that show the highest performance in terms of improvement show a scenario with the presence of profiles of countries with high deltas both in terms of digital performance both in socio-economic terms. In this case, the reasons are related to the presence of countries such as Slovakia (DESI 0.32; Human Capital 0.28; Use of Internet 0.27; Integration of Digital Technology 0.36; Social Progress Index 0.33; Corruption Perception Index -0.04; Global Innovation Index 0.04), Czech Republic (DESI 0.53; Human Capital 0.40; Use of Internet 0.23; Corruption Perception Index - 0.04; Global Innovation Index 0.05) and Romania (DESI 0.28; Social Progress Index; 0.37; Corruption Perception Index -0.09; Global Innovation Index 0.06;) which are included in the least developed countries in the EU and therefore enjoy a greater room for growth both in digital and economic terms, also supported by EU economic policies for incoming countries.

The scenarios above described support the results of the statistical correlation test highlighting the probable digital lever function of DESI and its dimensions on the socio-economic context of European countries.

Conclusions

The paper highlighted the high evolutionary speed of technological innovations and the innovative trajectories that it imposes in terms of continuous and repeated changes that are inevitably reflected in organizational, cultural, socio-economic and political models. These changes are no longer product or process, incremental or evolutionary, but, in the case of digitalization, innovation is identified as disruptive, that is, it brings profound changes and improvements that are totally different from previous ones. Therefore, in the thesis, the theme of an era characterized by phenomena of rapid obsolescence of goods and services, also due to the current health and economic experience we are experiencing, becomes strategic, both concerning the ability to manage technological innovations to be part of the countries, implementing adaptive behaviors in relation to the changes that their external reference environment is capable of producing, which respond to the socio-economic uncertainties that must be faced and resolved.

This study from a theoretical point of view in relation to the topic of digital economy processes and its related effects, has contributed to provide useful tools for identifying any correlations and linear relationship models between the digital context and the socio-economic dimension of countries. In the European context, it has not directly focused on assessing the direct economic growth of countries but has taken into consideration a broader reference framework including aspects of society, such as the ability to create business and innovation by companies, the presence of corruption in government bodies and the social and environmental development of countries. In this line of research, the study focused, among other things, on finding answers to some research questions. Specifically, in carrying out a comparative analysis of the digital positions of European countries, the research aimed to assess the existence of a possible correlation and the relative level of significance between the level of digitization and the socio-economic situation in the context European. In addition, the analysis aimed to identify the most influential digital levers on the socio-economic aspects of the 28 European Member States. Following this approach, the study showed a series of correlations between the level of digitization and the four socio-economic indices considered (SPI, CPI, GII, DB), always showing positive correlations. This condition has resulted in scenarios in which socio-economic improvements are positively influenced by digital improvements. The results showed that digital dimensions showed correlations and intensity with socio-economic indices, highlighting some of them as the most effective digital levers (Human Capital, Connectivity, Integration of Digital Technology) on the aforementioned socio-economic indices.

Following this approach, in the European context, countries should operate mainly on the digital dimensions, which have emerged as the most effective, to aspire to obtain satisfactory results in the socio-economic context.

Investments in technologically advanced infrastructures are also identified in this strategic analysis for overcoming the digital divide and the development of basic and advanced digital skills, as well as for supporting digital innovation for businesses and PA.

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Acknowledgements

As part of the Research Program V: ALERE – Università della Campania Luigi Vanvitelli, Italy

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