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The Correlation between Sustainable Development and Digitalization in the Post-Pandemic Era

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Abstract: *This study contains both a qualitative and a quantitative approach regarding the correlation between digitalization and sustainable development and the significance level of the impact that digitalization might have on sustainable development. In order to conduct the research, the dependent and independent variables were selected. We selected as a dependent variable representing the sustainable development, the Social Progress Index and as independent variables, representing the digitalization area, the share of enterprises turnover on e-commerce and share of Individuals who have never used the internet. The database was created for 24 European countries for a period of 6 years (2016, 2017, 2019, 2020, 2021 and 2022). The main conclusion of the study indicates to a strong direct correlation between the Social Progress Index and the share of enterprises turnover on e-commerce and a strong and reverse correlation between the Social Progress Index and the share of Individuals who have never used the internet. Also, based on the linear regression model, we can affirm that for the selected period of time and for the 24 European countries, the increase with one unit of the social progress index, the enterprises turnover on e-commerce (%) increases with 2.06 units. As well, at the increase with one unit of the social progress index, the percentage of the individuals who never used the internet increases with 0.18 (decreases). However, the current model has its own limitations based on the restricted number of variables and time period considered in the database.*

Keywords: Sustainable development, Sustainable development goals, Digitalization, Digitainability, Social Progress Index, Share of enterprises' turnover on e-commerce, Share of Individuals who have never used the internet

Introduction

The subject of sustainable development and the objectives set to achieve it is an extremely current and interesting one, along with digitization, which seems to be increasingly present in all aspects of the economy. The trend is therefore, adaptation to digitization in all economic sectors, but also orientation towards sustainability, towards a green economy and towards the conservation of resources for future generations. In this sense, we consider it of interest to quantify the correlation between the two concepts to determine if digitalization can really lead to sustainable development (of course also based on the influence of other external factors). Therefore, the work contains a revision of the specialized literature with an emphasis on the most recent articles in the field of sustainable development and digitalization. Aspects regarding the quantification of the 17 objectives of sustainable devotion will be pointed out, as well as the main challenges brought to these objectives. Also, based on the theoretical aspects studied, the most representative indicator for quantifying sustainable development will be chosen, which will be used in the practical part of the work. Afterwards, the most recent theoretical aspects related to the subject of digitization will be pointed out.

The practical research methodology is based on the construction of a database using the information provided both in the Social Progress Report and on the Eurostat website (Eurostat, 2023). The database includes a total of 24 European countries for which data were collected

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regarding the value of the Social Progress Index, Share of enterprises' turnover on e-commerce and share of Individuals who have never used the internet. To begin with, each variable will be briefly presented and its evolution in the period considered for analysis (years 2016, 2017, 2019, 2020, 2021 and 2022), and then the correlation coefficients between the three variables will be presented and interpreted. The last part of the analysis will consist of the creation of a simple linear regression model based on which a significant link between the three variables considered for the analysis will be tested. The results of the regression model will be interpreted and analyzed so that at the end a more concrete conclusion can be drawn regarding the relationship between variables at the level of European countries during the last 6 years.

Literature review

Sustainable development and its implications

The topic related to sustainable development was firstly approached in the Brundtland Report from 1987, which means that interest in the main areas such as climate change, world hunger and green economy was raised a long time ago. However, it was only in 2015 that the current sustainable development objectives or goals were adopted by the United Nations with the aim of being achieved until 2030. These objectives refer to the aspects such as poverty eradication, ending the hunger, improving health and wellbeing, improving the quality of education, achieving gender equality, improve the quality of water, achieve clean energy and economic growth, innovation and improved infrastructure, promote climate action, achieving peace and justice. While the aspects related to the goals of sustainable development might seem positive and productive in order to achieve a better life worldwide, some critics suggest that there might be some significant contradictions between the goals of sustainable development. The most common contradiction highlighted by authors (Hangoma and Surgey, 2019, and Perovic and Coric, 2024) related to the objective that involves an annual Gross Domestic Product (GDP) growth target of 7% for the least developed countries, as the GDP, even if it is considered to be an indicator of the country well-being, it tends to involve also environmental degradation. In other words, it is possible that in the race to achieve the sustainable objectives and targets set by the end of 2030, to violate one of the fundamental aspects of sustainable development.

Although, at first glance, the 17 goals outlined related to sustainable development may seem difficult to quantify or measure, there are a number of indicators designed to give a concrete numerical perspective regarding the components of each particular goal. Thus, in what follows, the list of indicators related to each specific objective will be presented, in accordance with the existing data on the Eurostat website (Eurostat, 2023).

Table 1. The objectives of sustainable development and their quantification indicators - part 1

Sustainable development goal	Indicator
Prevention and eradication of poverty	People at risk of poverty or social exclusion
	Housing cost overburden rate by poverty status
	Self-reported unmet need for medical examination and care by gender
Prevention and eradication of hunger	Obesity rate by body mass index
	Government support for agricultural research and development
	Estimated soil erosion by water - area affected by severe erosion rate
Achieving well-being and health for the entire population	Share of people with perceived good or very good health by gender
	Obesity rate by body mass index
	Deaths in road traffic, by type of road

Sustainable development goal	Indicator
Easy access of the population to a quality education	Rates of early leavers from education and training by gender
	Participation in early education by gender
	Share of people who have at least basic digital skills
Gender equality	Physical and sexual violence against women by age group
	Employment gap between women and men by type of employment
	Level of higher education by gender
Easy accessibility to drinking water and sanitation for the entire population	The population that has neither a bathtub, nor a shower, nor an indoor toilet in the household according to poverty status
	Population connected to at least secondary wastewater treatment
	Biochemical oxygen demand in rivers
The existence of clean and affordable energy for the whole world	Primary energy consumption
	Final energy consumption in households per capita
	Share of renewable energy in gross final energy consumption per sector
Achieving economic growth and access to decent occupational groups for the entire population	Real GDP per capita
	Share of investments in GDP by institutional sectors
	Youth neither employed nor in education and training by gender
Existence of innovation in infrastructure and industry	Gross domestic expenditure on research and development by sector
	Research and development staff per sector
	Share of buses and trains in domestic passenger transport
Eradication or reduction of inequalities	Adjusted purchasing power GDP per capita
	Asylum applications depending on the status of the procedure
	Early leavers from education and training programs after citizenship
The existence of durable and sustainable cities and communities	Severe homelessness rate by poverty status
	Population living in households considered to suffer from noise, by poverty status
	Municipal waste recycling rate

Source: Authors' own research.

Table 2. The objectives of sustainable development and their quantification indicators - part 2

Sustainable development goal	Indicator
The existence of production and consumption trends focused on responsibility and frugality	Consumption of chemical substances by hazard - EU aggregate
	Consumption of raw materials
	Circular material utilization rate
Taking action to protect climate-related issues	Net greenhouse gas emissions
	Net greenhouse gas emissions from land use, land use change and forestry
	Climate-related economic losses
Protecting the environment. Underwater life	The surface of marine protected areas
	Estimated trends in biomass of fish stocks, by fishing area
	Bathing places with excellent water quality in the locality
Orientation towards peace, justice. Earth life	Share of forest area
	The surface of protected terrestrial areas
	Estimated soil erosion by water - area affected by severe erosion rate
The existence of global partnerships in order to achieve the objectives	Official development assistance as a share of gross national income
	Gross public debt
	Share of environmental taxes in total tax revenues
	Standardized Homicide Mortality Rate by Gender

Sustainable development goal	Indicator
The existence of strong institutions to effectively govern in this area	The population that reported the occurrence of crimes, violence or vandalism in their area according to poverty status
	The total expenditure of the public administration for the courts

Source: Authors' own research.

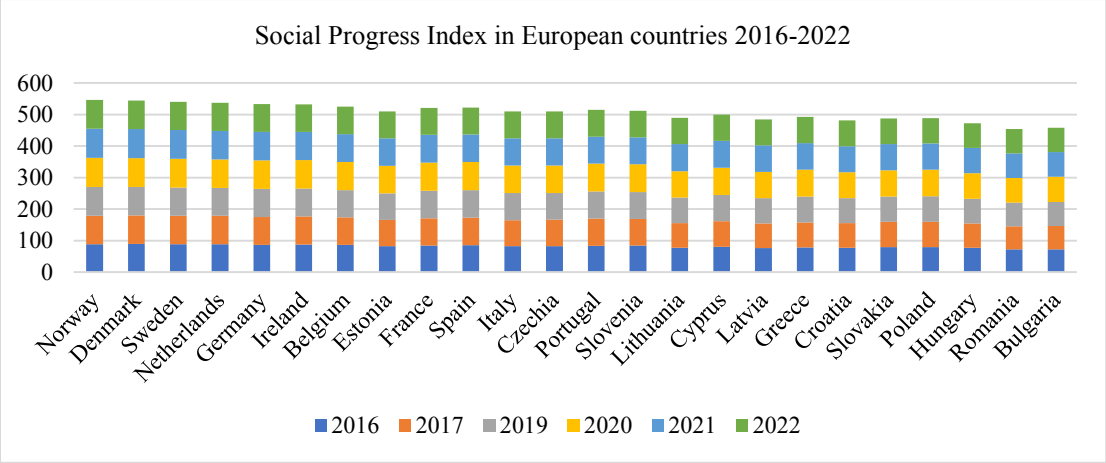
Over the years, researchers tried to quantify the implementation of the sustainable development objectives in order to help the countries to identify the priorities that they need to consider in the sustainable development area. One of the researches in this domain (Gripenberg, 2015) included the Sustainable Wellbeing Index with sub-indices that relate to sustainable well-being (net economic contribution, contribution to ecosystem services and community contribution). Another article (Bohr, 2020, p.74) focused on the same area indicates that there are 18 potential sustainable development targets, such as reaching a level of 10,000 USD of GDP per capita in all countries by 2050. In this case the measurement of the progress would be the current level of the GDP per capita which needs to be compared with the target. The UNESCAP (United Nations of Social Commission for Asia and Pacific) use two indicators in order to measure progress: current status (difference between the value of the objective and the status from 2000) and the index related to anticipate progress gap (gap between the target of the objective until 2030 and the predicted value) (Bidarbakht, 2017, p. 6). Another way of quantifying the objectives of sustainable development is based on the real progress index and the human development index (Gripenberg, 2015). Also, there are several trackers on the internet which give a holistic perspective related to the quantification of each sustainable development goal. On the Our World in Data website, each goal has its specific category and contains a list of indicators used in order to quantify the progress for each country (for example for the goal related to ending the hunger and promoting the sustainable agriculture, some of the indicators relate to sustainable food production, local breeds at risk of extinction and agriculture orientation index) (Our World in Data team, 2023). However, based on a recent research (Gripenberg, 2015), the index that turned out to be the most comprehensive, as it includes 11 of the 17 objectives of sustainable development is the Social progress index (SPI). This index is a comprehensive measure designed to assess and quantify social progress independently of economic indicators. It aims to provide a more holistic understanding of a country's development by focusing on social and environmental outcomes. The Social Progress Index was first introduced by the Social Progress Imperative, a nonprofit organization, in 2013 and the organization provides yearly the ranking of all countries or the index, along with a detailed report on the evolution of the index (Greve, 2016). The key components of the index include aspects related to basic human needs, foundations of wellbeing and human rights opportunities. These components are measured using various indicators and data sources to provide a comprehensive view of a country's social progress. The SPI is distinct from traditional economic indicators such as GDP (Gross Domestic Product) because it focuses on the well-being and quality of life of individuals rather than purely economic factors. The index is typically calculated based on available and comparable data across countries, and it helps policymakers, researchers, and the public understand how well a society is performing in terms of social and environmental outcomes (Estes, 2014). The goal is to offer a more nuanced perspective on development beyond economic growth, recognizing that factors like health, education, and personal rights are essential contributors to overall well-being.

We consider that given the current global context, while approaching the sustainable development area, digitalization also plays an important part. Digitalization in a country refers to the process of integrating digital technologies and leveraging them across various aspects of society, economy, and governance. It involves the adoption and incorporation of digital tools, infrastructure, and practices to enhance efficiency, accessibility, and innovation in different sectors. The definition of digitalization in a country encompasses several dimensions such as technological infrastructure, digital services and platforms, e-government and public services, digital economy, education and skills development, healthcare and telemedicine, smart cities and infrastructure, data analytics and artificial intelligence, cybersecurity and data privacy and innovation and collaboration (Gobble, 2019). In the last years, especially after the Covid-19 pandemic, the digitalization and the e-commerce area increased significantly across the world (Ahmad et al., 2023).

In some current articles (Lichtenthaler, 2019), researchers discuss about a new term, digitainability, which represents the effect of combining the two areas of sustainability and digitalization. While overall, digitalization is perceived as a positive element which helps nations to achieve the goals of sustainable development (through e-health for example), there are some critics who argue that digitalization is not that positive. Even if digitalization seems to be more and more present in today's world, where also sustainability tries to find its place and seems to gain a significant role, some authors (Lichtenthaler, 2019) highlight the potential negative aspects of digitalization especially based on the carbon footprint and energy consumption of technology. However, some authors (Seele and Lock, 2017) consider based on the current status of sustainability and digitalization worldwide that we are still at the beginning of leveraging the transformative potential of both concepts.

Methodology

Firstly, in the following section, we are going to present the variables that are going to be considered for the analysis and their evolution in the last 6 years (period 2016-2022 except 2018). Therefore, the first variable considered for the analysis is the SPI. This index is typically calculated based on available and comparable data across countries, and it helps policymakers, researchers, and the public understand how well a society is performing in terms of social and environmental outcomes. The goal is to offer a more nuanced perspective on development beyond economic growth, recognizing that factors like health, education, and personal rights are essential contributors to overall well-being. The author should make references to some previous research similar to the present one, if that is the case. Also, the author should mention the software programs used for processing statistical data, if it is the case.



Graphic 1. Social Progress Index in European countries 2016-2022

Source: Authors' own research.

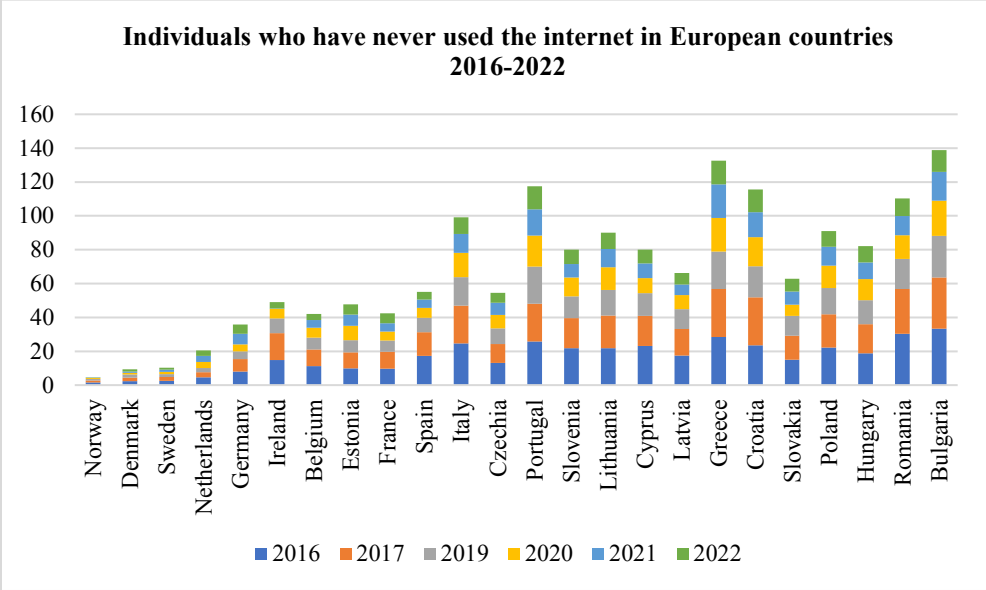
The next variable considered for the analysis is the variable related to the "Share of enterprises turnover on e-commerce" is considered representative for digitalization because it provides a quantitative measure of the extent to which businesses are utilizing digital platforms and technologies for conducting transactions and generating revenue. Enterprises engaged in e-commerce typically leverage various digital technologies, including online platforms, websites, and electronic payment systems. The higher the share of turnover from e-commerce, the more likely it is that businesses have adopted and integrated these technologies into their operations.

Graphic 2. Share of enterprises turnover on e-commerce - % in European countries 2016-2022

Source: Authors' own research.

Another representative variable is the one related to the "Individuals who have never used the internet" is representative for digitalization because it provides insight into the extent of digital inclusion or exclusion within a population. The absence of internet usage among a segment of individuals is indicative of limited digital adoption and highlights barriers to access. The variable reflects disparities in digital access. Individuals who have never used the internet may face challenges related to infrastructure, affordability, or digital literacy, indicating unequal access to

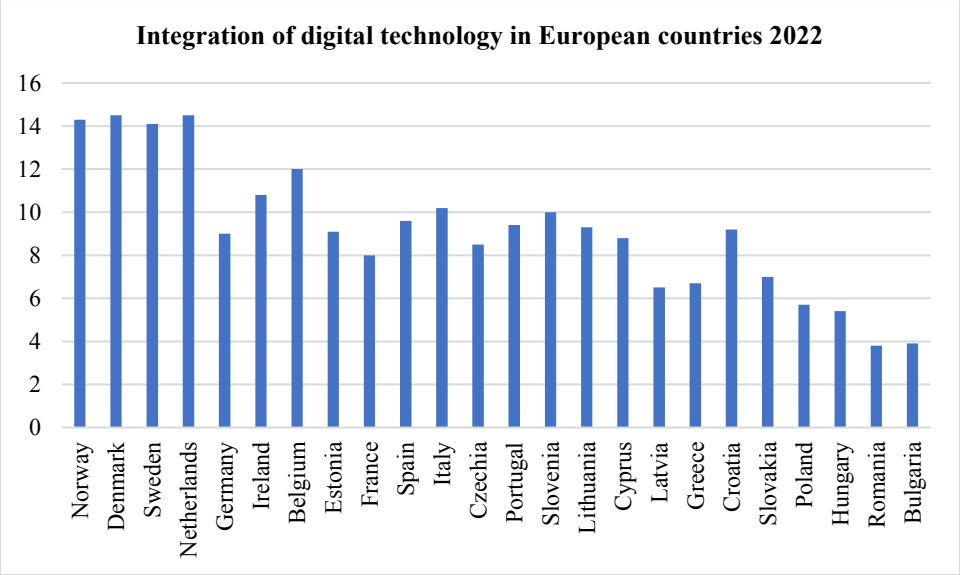
digital resources. The lack of internet usage may be linked to lower levels of digital literacy and skills. Individuals who have never used the internet may not be familiar with online tools, digital platforms, or the basic skills needed to navigate the digital landscape. Digitalization is often associated with economic and social opportunities. Individuals without internet access may face exclusion from online job markets, e-commerce opportunities, and various social and civic platforms, limiting their participation in the digital economy.



Graphic 3. Individuals who have never used the internet in European countries 2016-2022

Source: Authors' own research.

Lastly, the level of integration of digital technology in a country is a key indicator of its social progress and digitalization level. The extent to which a nation incorporates digital technologies across various aspects of society reflects its commitment to leveraging technology for social and economic development. A high level of digital technology integration is often associated with increased economic growth and innovation. Countries that effectively adopt digital technologies in industries, businesses, and services are more likely to experience positive economic outcomes. Also, digitalization enhances a country's resilience to global challenges, such as economic uncertainties and public health crises. Countries with advanced digital infrastructure and integrated technologies are better equipped to adapt and respond to unforeseen challenges.



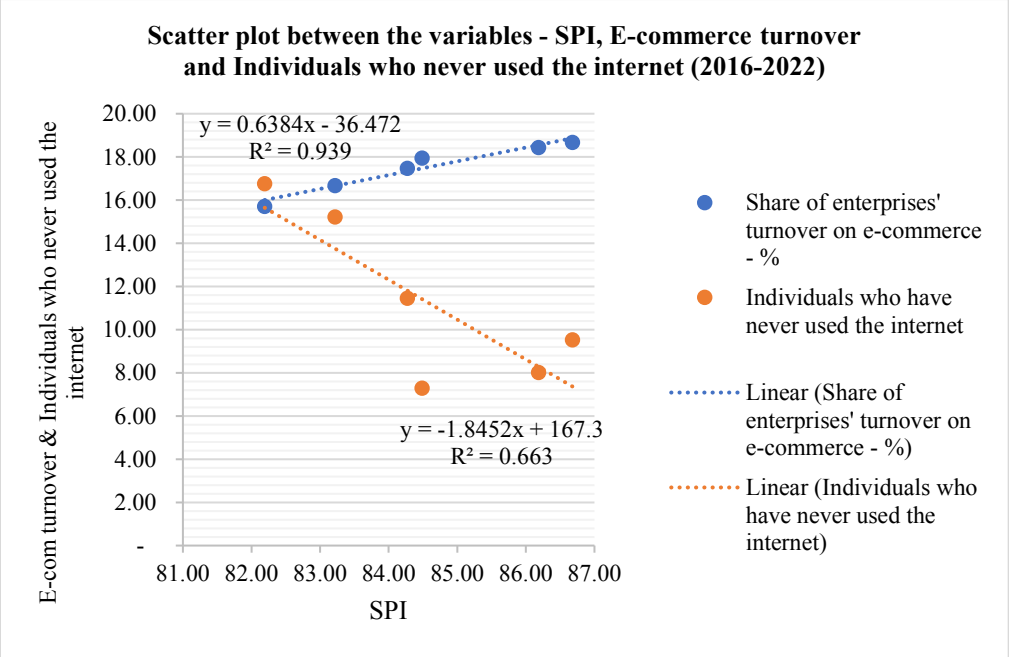
Graphic 4. Integration of digital technology in European countries 2022

Source: Authors' own research.

The next section of the analysis includes a linear regression model between Social Progress Index, share of enterprises' turnover on e-commerce - % and Individuals who have never used the internet. The Social progress Index was considered the dependent variable while the share of enterprises' turnover on e-commerce - % and Individuals who have never used the internet were considered independent variables. The purpose of the regression model is to understand if the digitalization variable represented by the two variables related to e-commerce and the percentage of individuals who never accessed internet has a significant impact on the social progress index. With this linear regression model, at a holistic level we are going to analyze how sustainable development and its objectives (represented by the social progress index) and digitalization (represented by the two independent variables) are strongly correlated especially in today's world and in the light of the most recent events (Covid-19 pandemic and the geopolitical environment).

Because any regression model needs a null and alternative hypothesis that are going to be validated or rejected based on the output, in our case the null hypothesis indicates that there is no significant impact of digitalization represented by the number of individuals who never used the internet and the turnover of the e-commerce companies on the sustainable development represented by the social progress index in the 24 European countries considered for the analysis between 2016 and 2022. On the other hand, the alternative hypothesis indicated that there is a significant impact between the dependent and independent variables. In other words, the evolution of the independent variables triggers a modification of the dependent variable.

The first step in our analysis was related to the correlation between the variables. The output of the model indicated a strong direct correlation between the social progress index and the share of enterprises' turnover on e-commerce - %, with a coefficient value of 0.96. The correlation between the social progress index and the percentage of individuals who have never used the internet is also strong, but the direction is not direct, as the value of the correlation coefficient is negative (-0.81). This indicates that as the value of the percentage of individuals who have never used the internet is decreasing, the value of the social progress index is increasing.



Graphic 5. Scatter plot between the variables - SPI, E-commerce turnover and Individuals who never used the internet (2016-2022)

Source: Authors' own research.

Continuing with the regression model, the output of the regression statistics indicates that the correlation coefficient between predicted values and actual values in a multiple linear regression model, represented by Multiple R has a value of 0.98. This indicates that in our regression model, 98% of the variation of the social progress index can be explained by the variation of the share of turnover on e-commerce and the percentage of the individuals who never used the internet, in the 24 European countries included in the analysis between 2016-2022. Also, the coefficient of determination – R squared has a similar value of 0.96, which indicates the same impact described above related to the percentage of the variation of the dependence variable that can be explained by the fluctuation of the independent variables. The F statistic value obtained based on the regression model was of 47.00. By comparing this value with the calculated value of F for 5% probability and 2 and 4 degrees of freedom (n=6) of 6.94, we can confirm that the F statistic value is higher than the F calculated value, which indicates the need to reject the null hypothesis that stated that there is no significant impact between the dependent and independent variables included in the model. Lastly, the linear regression model was analyzed based on the value of the coefficients. Therefore, based on the output, the intercept of the model has a value of 46.34. The coefficient related to the share of enterprises turnover on e-commerce (%) is 2.06, which indicates that at the increase with one unit of the social progress index, the enterprises turnover on e-commerce (%) increases with 2.06 units. The coefficient corresponding to the variable related to the individuals who have never used the internet is 0.18, which indicates that at the increase with one unit of the social progress index, the percentage of the individuals who never used the internet increases with 0.18 (decreases). In this case, the linear regression model can be presented based on the below equation:

SPI = 46.34 + 2.06 * enterprises turnover on e-commerce (%) + 0.18 * Individuals who never used the internet (%)

Results and discussions

Based on the bibliography considered for the literature review, we can conclude that there is a significant link between sustainable development and digitization, even if many times digitization can prove to be harmful to the environment, which contravenes the basic principles of sustainable development.

The research demonstrated that there is a significant positive and strong correlation between the social progress index and the enterprises turnover on e-commerce and a significant, strong and negative correlation between the social progress index and the percentage of individuals who never used the internet on the 24 European countries included in the analysis between 2016 and 2022. Also, based on the linear regression model, we have demonstrated that 98% of the variation of the social progress index can be explained by the variation of the share of turnover on e-commerce and the percentage of the individuals who never used the internet, in the 24 European countries included in the analysis for the last 6 years. Lastly, based on the regression equation, we concluded that at the increase with one unit of the social progress index, the enterprises turnover on e-commerce (%) increases with 2.06 units and the percentage of the individuals who never used the internet increases with 0.18 (decreases).

Therefore, the model confirmed that there is a strong correlation and impact between the sustainable development and digitalization across the European countries in the last 6 years included in the analysis. The limitations of the model relate to the variables considered in order to represent two concepts – sustainable development and digitalization, and the restricted period of time (only 6 years) included in the analysis. It is necessary to mention that the fluctuation of the social progress index is also under the influence of other variables and factors besides the ones included in our model.

Conclusion

The correlation between sustainable development and digitalization is highly relevant in the contemporary context, and it reflects the intersection of environmental, economic, and social goals with technological advancements. Digitalization facilitates the implementation of circular economy models. Technologies like block chain can enhance supply chain transparency, enabling better tracking and recycling of materials, ultimately contributing to reduced waste and more sustainable consumption patterns. Also, digitalization supports the dissemination of information related to sustainable practices and environmental awareness. It provides a platform for education and awareness campaigns, fostering a global understanding of sustainable development goals. On the same page, digitalization fuels economic growth through innovation and entrepreneurship. Sustainable development goals can be achieved through the creation of digital solutions that address environmental and social challenges while fostering economic development. However, the increased use of digital technologies, data centers, and cloud computing can lead to significant energy consumption. If this energy is not sourced from sustainable and renewable sources, it can contribute to carbon emissions and environmental degradation.

Throughout the research we were able to present both the positive and negative aspects of digitalization in the context of sustainable development, and it's necessary to mention that overall, as all things, digitalization has its price and because at the moment we are only at the beginning of fully utilizing and increasing the benefits from both sustainable development and digitalization, some of the negative impact of digitalization can be mitigated on the long term. To address these potential negative impacts, policymakers, businesses, and communities must adopt strategies that

prioritize sustainability, ethical considerations, and inclusivity in the digitalization process. Implementing regulatory frameworks, promoting responsible consumption and production, and fostering digital literacy are essential elements in managing the potential downsides of digitalization on sustainable development. Also, even if a various number of indicators are utilized in order to measure the progress of countries regarding the potential of achieving the sustainable development goals, the Social progress Index represents the most relevant one at the moment.

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Appendix

Table 1. SPI for the 24 European countries between 2016 and 2022

Country / Variable	SPI					
	2016	2017	2019	2020	2021	2022
Norway	88.7	90.27	90.95	92.73	92.63	90.74
Denmark	89.39	90.57	90.09	92.11	92.15	90.54
Sweden	88.8	89.66	89.45	91.62	91.2	89.42
Netherlands	88.65	89.82	88.31	91.06	90.57	88.97
Germany	86.42	88.5	88.84	90.56	90.32	88.72
Ireland	87.94	88.91	87.97	90.35	89.47	87.69
Belgium	86.19	87.15	86.77	89.46	88.68	87.22
Estonia	82.62	82.96	83.98	87.26	87.38	86.16
France	84.79	85.92	87.79	88.78	88.23	86.04
Spain	85.88	86.96	87.47	88.71	87.53	85.35
Italy	82.49	82.62	85.69	87.36	86.56	85.23
Czechia	82.8	84.22	84.36	86.69	86.6	85.19
Portugal	83.88	85.44	87.12	87.79	85.97	84.75
Slovenia	84.27	84.32	85.8	87.71	85.83	84.19
Lithuania	76.94	78.09	81.3	83.97	85.58	83.71
Cyprus	80.75	81.15	83.14	86.64	85.03	83.18
Latvia	76.19	78.61	80.42	83.19	83.43	82.46
Greece	78.27	78.92	82.48	85.78	84.37	82.44
Croatia	77.68	78.04	79.21	81.92	82.82	82.32
Slovakia	78.96	80.22	80.43	83.15	83.69	81.29
Poland	79.76	79.65	81.25	84.32	83.08	80.17
Hungary	76.88	77.32	78.77	81.02	80.15	78.21
Romania	72.23	73.53	74.81	78.35	78.41	76.89
Bulgaria	72.14	74.42	76.17	79.86	78.81	76.81
SUM	1,972.62	1,997.27	2,022.57	2,080.39	2,068.49	2,027.69
Mean between countries	82.19	83.22	84.27	86.68	86.19	84.49

Source: Authors' own research.

Table 2. Share of enterprises turnover on e-commerce for the 24 European countries between 2016 and 2022

Country / Variable	Share of enterprises turnover on e-commerce - %					
	2016	2017	2019	2020	2021	2022
Norway	24	20.6	26.4	18.8	22.4	20.2
Denmark	22.5	22.7	24.9	29.5	28	24
Sweden	20.9	18.8	24.8	24.4	26.1	26
Netherlands	14.3	14.6	13.9	17.3	18.9	19.9
Germany	14.4	20.7	15.1	17.9	19.1	17.3
Ireland	35.1	33.3	34.1	44	37.9	33.1
Belgium	28.6	31.4	32.6	31.4	28.2	27.7
Estonia	15.1	16.4	13.9	14.3	15.5	15.8
France	16.7	19	22	23.1	21.7	11
Spain	15.5	16.4	17.1	19.1	19	19.9
Italy	8.8	10.1	11.5	12.7	12.9	17.8
Czechia	30.5	31	31.7	29.8	30	29.9
Portugal	14.5	16.5	19.1	19.8	17.2	17.2
Slovenia	15.1	16.3	17.4	17.8	17.9	17.4
Lithuania	10.9	12.6	12.6	13.9	17.9	17.7
Cyprus	4.2	5.3	5.5	5.9	4.3	5.4
Latvia	6.9	8.7	7.1	9.8	10.2	10.1
Greece	5.5	3.6	3.8	4.3	5.8	6.9
Croatia	13.6	11.1	11.6	14.4	15.3	16.5
Slovakia	18	22	21	21.4	19.4	22.7
Poland	14.4	15.2	17.7	16.8	17.7	16.8
Hungary	16.5	19.9	23.6	23.3	21.4	19.5
Romania	7	8.4	7.4	12.4	9.2	10.9
Bulgaria	3.9	5.4	4.5	6.1	6.2	6.9
SUM	376.90	400.00	419.30	448.20	442.20	430.60
Mean between countries	15.70	16.67	17.47	18.68	18.43	17.94

Source: Authors' own research.

Table 3. Share of individuals who have never used internet for the 24 European countries between 2016 and 2022

Country / Variable	Individuals who have never used the internet					
	2016	2017	2019	2020	2021	2022
Norway	1.66	1.11	0.82	0.67	0.26	0.08
Denmark	2.44	2.03	1.86	0.91	0.69	1.48
Sweden	2.53	2.25	1.81	1.19	1.37	1.13
Netherlands	4.65	2.96	2.43	3.71	3.49	3.22
Germany	7.99	7.37	4.65	4.12	6.19	5.52
Ireland	14.87	15.85	8.65	5.75	0.07	3.86
Belgium	11.23	9.84	6.94	5.86	4.55	3.7
Estonia	9.97	9.33	7.25	8.57	6.52	6.12
France	9.8	9.97	6.68	5.2	4.85	5.88
Spain	17.32	14.01	8.37	6.03	4.86	4.47
Italy	24.7	22.32	16.83	14.23	11.25	9.88
Czechia	13.15	11.13	9.28	7.92	7.25	5.73
Portugal	25.79	22.34	21.97	18.22	15.61	13.62
Slovenia	21.9	17.62	13	11.12	7.82	8.62
Lithuania	21.75	19.29	15.11	13.53	10.71	9.75
Cyprus	23.2	17.79	13.41	8.85	8.72	8.15
Latvia	17.41	15.83	11.59	8.43	6.22	6.69
Greece	28.42	28.33	22.15	19.89	19.86	13.97
Croatia	23.44	28.38	18.31	17.2	14.91	13.41
Slovakia	15.07	14.04	11.71	6.74	7.75	7.48
Poland	22.27	19.62	15.48	13.16	11.14	9.42
Hungary	18.87	17.04	14.25	12.46	9.93	9.54
Romania	30.29	26.54	17.66	14.05	11.36	10.35
Bulgaria	33.32	30.29	24.49	20.89	17.02	12.76
SUM	402.04	365.28	274.70	228.70	192.40	174.83
Mean between countries	16.75	15.22	11.45	9.53	8.02	7.28

Source: Authors' own research.

Table 4. Mean values for the variables for the 24 European countries between 2016 and 2022

Variable / Year	SPI	Share of enterprises' turnover on e-commerce - %	Individuals who have never used the internet
2016	82.19	15.70	16.75
2017	83.22	16.67	15.22
2019	84.27	17.47	11.45
2020	86.68	18.68	9.53
2021	86.19	18.43	8.02
2022	84.49	17.94	7.28

Source: Authors' own research.