

# **THE IMPORTANCE OF UNIVERSITIES FOR SOCIETY AND ECONOMY THE EXPERIENCE OF RESEARCHERS FROM THE VISEGRÁD GROUP**

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## CHAPTER 7

### The Digital Catalyst for Sustainable Development in Europe: E-Government Perspective

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**Abstract:** The aim of the research was to assess the progress of e-government in EU countries and the extent to which it is linked to sustainable development. To this end, indices were used, namely the E-Government Development Index (EGDI) and Sustainable Development Goals (SDGs), to identify whether there are links between e-government development and sustainability. At the same time, the chapter highlights geographical links. Although the links between e-government development and sustainability development were identified in the chapter, there are differences in Europe, especially in northern and western countries compared to the group of south-eastern countries. It is also necessary to understand the underlying factors contributing to these disparities in order to ensure the balanced development of society, as well as from a sustainability perspective.

**Keywords:** e-government, digitalisation, sustainable development, Sustainable Development Goals (SDGs)



#### 7.1. Introduction

In an era where the digital revolution is reshaping the contours of governance and development, the chapter presents the trajectory of e-government evolution within Europe. The essence of this exploration lies in tracing developmental strides, as reflected in the E-Government Development Index (EGDI), and comparing them with

advancements in Sustainable Development Goals (SDGs) indexes. The study's pivotal intent is, firstly, to visually narrate the progress of e-government via a comparative analysis; secondly, to scrutinise the SDG index score shifts and discern regional patterns of development; and thirdly, to explore the relationship between the two indices to understand how advancements in e-government may correlate with achievements in sustainable development objectives. Moreover, comparing the Sustainable Development Goals index score (SDG index score) and particular goals (SDGs indexes) is critical in assessing global and regional progress towards meeting the comprehensive set of goals established to address the world's major social, economic, and environmental challenges. The chapter's contribution is to extend the body of knowledge on global trends such as ongoing digitalisation and sustainable development by examining if e-government development relates to sustainable development. By examining the changes in the SDG index score, one can identify areas of improvement, stagnation, or regression, which in turn can inform policy decisions and prioritise areas for intervention. The study paves a path to understanding the digital undercurrents which are increasingly becoming synonymous with efficient governance and public sector innovation. An additional value of this study is mapping and showing of the differences in e-government development and level of SDGs achievements across EU countries.

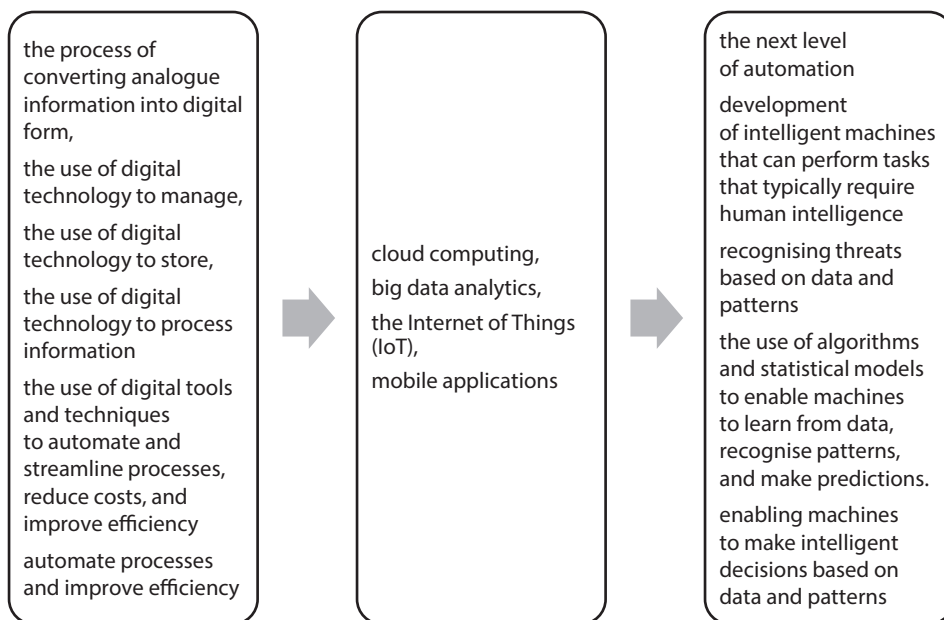


## 7.2. Increasing the Role of Digitalisation in the Public Sector

Technology changes, as well as digitalisation processes, have become features of the current economy. The Internet has become the ubiquitous tool which facilitates the functioning and exchange of information, not only for enterprises, but also for individuals. The fast development of information and communication technologies (ICTs) as new forms of economic prosperity, are based on the transfer of information and knowledge (Dabinett, 2001).

Digital transformation, which is essentially the impact of digital technology on economies and societies, is paving the way for the next stage of development through the use of AI (see Fig. 7.1). This opens up new possibilities, particularly in terms of boosting productivity and enhancing the well-being of all citizens, while striving to achieve sustainable development goals.

Throughout the late 20th century, scholars drew attention to the potential of global information exchange facilitated by advancements in computer communication technologies (Webster, 2006). The relation between information and communication technologies (ICT) infrastructure and the economy was thoroughly examined by Piore and Sabel (1984), emphasising the critical connection between technology and market dynamics.



**Fig. 7.1.** From digitalisation to artificial intelligence implementation

Source: own elaboration based on (Van Noordt et al., 2020).

The concept of digitalisation signifies the progressive augmentation of digital data accessibility (Brennen & Kreiss, 2016). The concept of digital infrastructure (DI) can be explored from two distinct perspectives (Barns et al., 2017). The initial approach characterises DI as the technical framework responsible for delivering digital communications to urban centres and regional areas. The second perspective refers to the role of government as a catalyst and facilitator of data-driven services. In general, DI can be divided into hardware, software, storage technology and communication technology (Rozikin et al., 2023).

DI is becoming more and more essential, particularly when it comes to providing and leveraging public sector services for citizens (Dečman, 2018). This growing importance is supported by an OECD report (OECD, 2018) which outlines key strategies for improving digital society. This ongoing transformation in public administration manifests as local governments progressively enhance their service delivery mechanisms through the adoption of online platforms (as discussed by Veeramootoo et al., 2018). Sangki (2018) emphasised the pressing need for fresh and innovative approaches to government development. His pioneering e-government model is distinctive in its capacity to harmonise both technological and social paradigms and offers a holistic perspective on the evolution of e-government, acknowledging the interplay between technology and society (Sangki, 2018).

E-government is defined as using ICT, particularly the Internet, as a tool to achieve better government (OECD, 2003). E-government enables all actors conduct their activities more easily, rapidly, and cost-effectively, as well as being able to interact with government authorities (Teşu, 2012). With technological progress and the evolution of the ICT and Internet industries and attempts to measure and reflect the state of the economy and society, institutions collecting data present their indicators, which are often linked to qualitative research methods such as surveys or mystery shopping. An increasing number of governments are turning to the internet to deliver public services to their citizens (March, 2010).



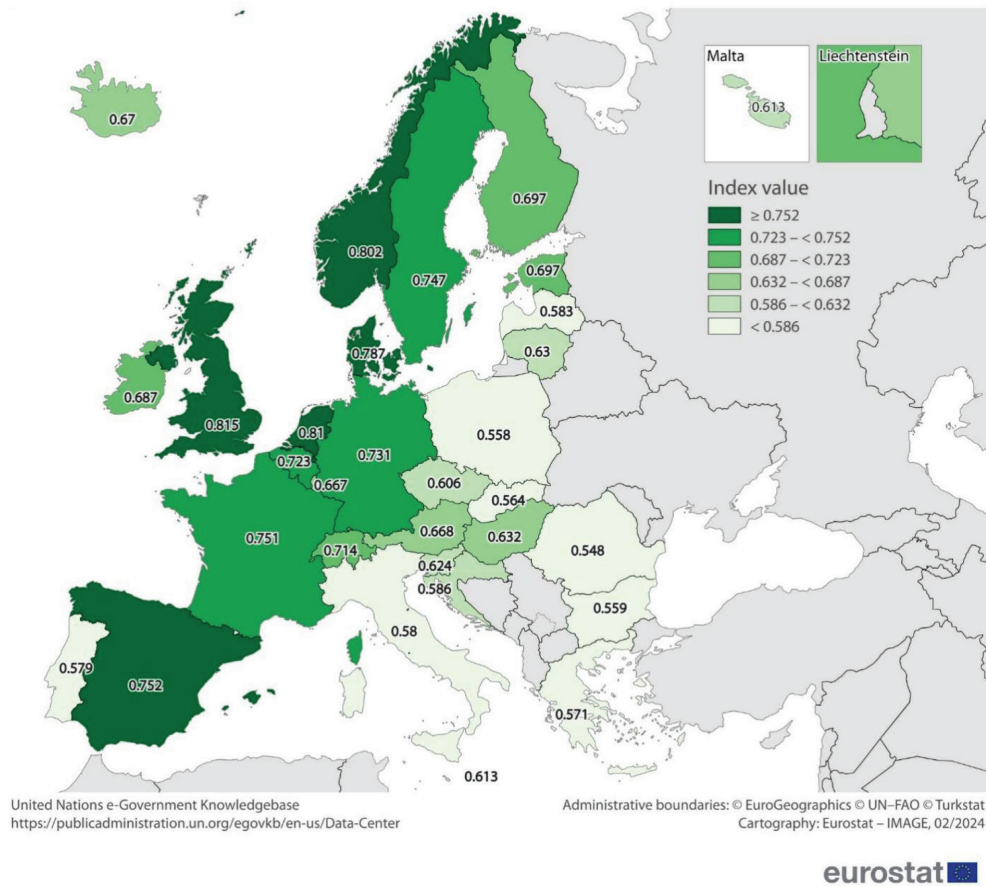
### 7.3. Methods

In this study, in order to follow changes in the EDGI and the SDGs indices, a comparative visual analysis across European countries in 2010 and 2022 took place. To this end the author's own maps were employed. The study also assessed the relation between the EDG and the SDG index score and particular SDGs using the EGDI, which assesses e-government development at national level – secondary data available at the United Nations E-Government Knowledgebase (United Nations, 2022), collecting data connected with digitalisation all over the world. Secondly, the authors used the main SDG index scores and selected SDGs indexes available at the Sustainable Development Report platform, collecting data and presenting a yearly dashboard reflecting SDG indicators from countries all over the world.

First, the descriptive statistics (Appendix) were implemented to determine the basic properties of the distributions obtained: range (min-max), measures of central tendency (mean and median), and dispersion (standard deviation), measures of asymmetry and concentration (skewness, kurtosis). To check if distribution differed from theoretical normal distribution, Shapiro-Wilk tests were calculated, as suggested for a situation of a relatively small sample size (Bedyńska & Książek, 2012). Next, an analysis was conducted using Pearson's correlation based on the assumptions of parametric tests (George & Mallery, 2019). At the next level, Pearson's correlation was used to show the relation between the EDGI and the SDG index score and SDGs indexes; only for Goal 4 was it necessary to perform an analysis using Spearman's rho rank correlation. An analysis was performed on the population of European countries and not on a sample, so no statistical significance was presented as results are applied to the countries researched. The strength of the correlation was indicated by colours – negative relations were marked with blue colours, and positive relations were marked with orange-red colours (correlations of negligible strength (–0.1 to 0.1) were marked in white).

## 7.4. Results

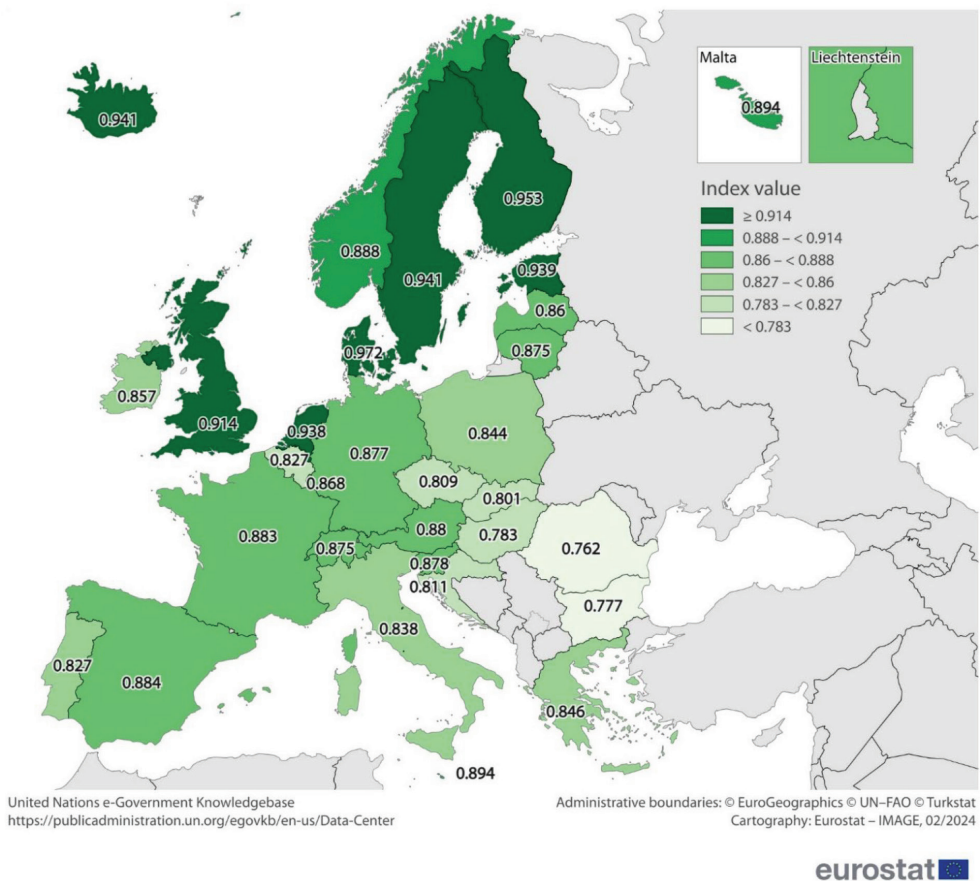
To show changes and underline the increase of EDGI, two maps presented a comparative visual analysis of the EDGI across European countries in 2010 and 2022. By juxtaposing these maps, it was aimed to discern the progress and changes in e-government development. The comparison reveals significant developments and potential shifts in digital governance capacities and priorities among the nations (Figs. 2 and 3).



**Fig. 7.2.** EDGI index score in 2010

Source: own elaboration based on (United Nations, n.d.).

From the maps for 2010 and 2022, there is a noticeable overall increase in EDGI scores across nearly all countries depicted. This upward trend reflects a concerted effort towards improving digital government services, infrastructure, and policy frameworks. The index changes highlight substantial advancements, indicating a strengthened emphasis on integrating technology with public services to enhance accessibility, efficiency, and transparency. Such progress underlines the evolving role of e-governance as a fundamental component of public administration reform and a key facilitator of sustainable development and citizen engagement across the continent.

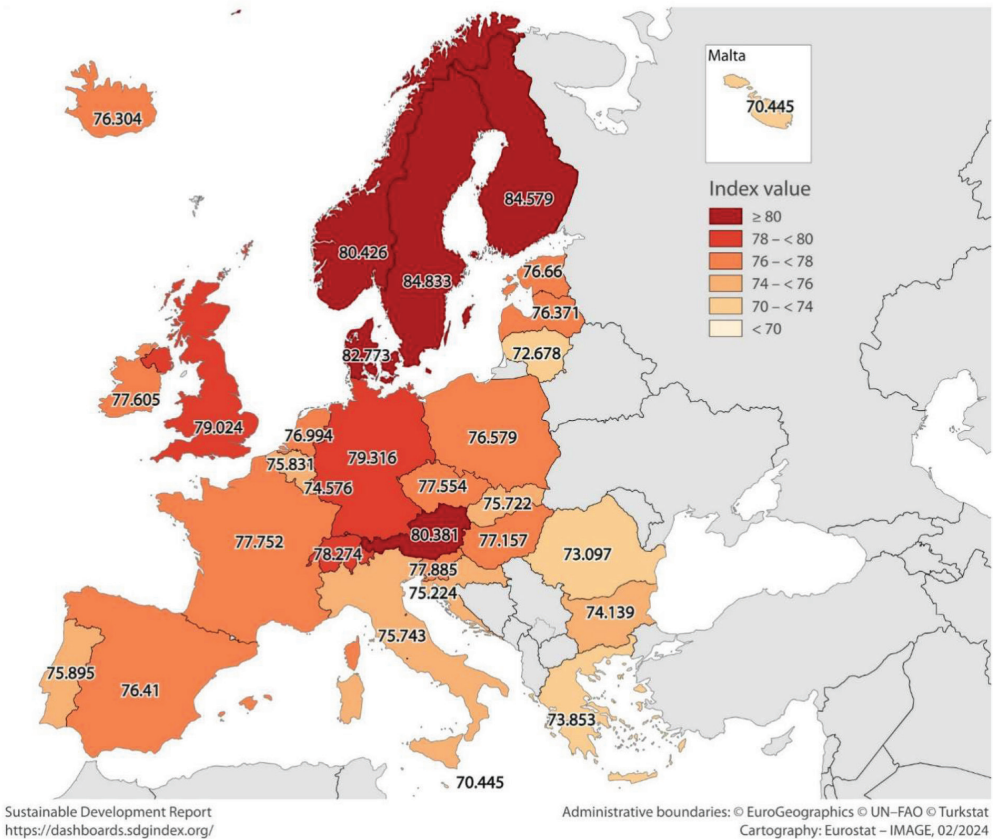


**Fig. 7.3.** EDGI index score in 2022

Source: own elaboration based on (United Nations, n.d.).

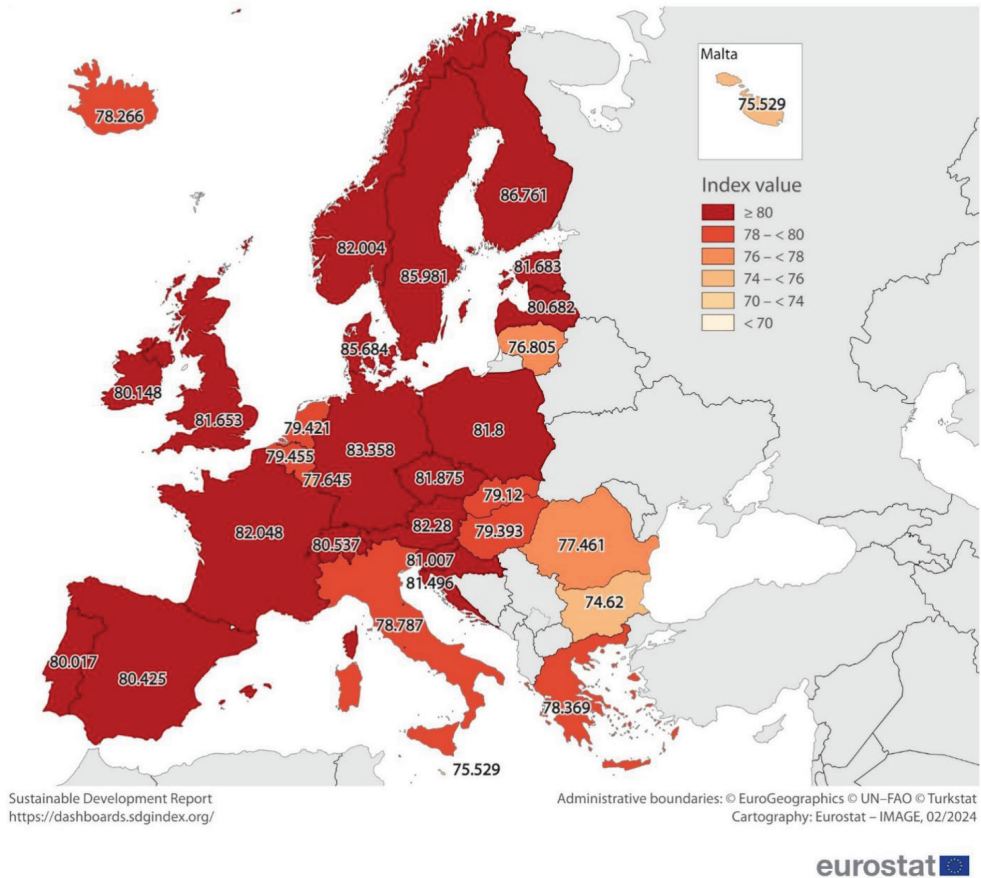


Additionally, the author compared the SDG index score changes (Figs. 7.4 and 7.5). Comparing the SDG index score is critical in assessing global and regional progress towards meeting the comprehensive set of goals established to address the world's major social, economic, and environmental challenges. By examining the changes in the SDG index from 2010 to 2022, one can identify areas of improvement, stagnation, or regression, which in turn can inform policy decisions and prioritise areas for intervention.



**Fig. 7.4.** SDG index score in 2010

Source: own elaboration based on (Sachs et al., 2023).



**Fig. 7.5.** SDG index score in 2022

Source: own elaboration based on (Sustainable Development Report 2024, n.d.).

The figures of the SDG index score for 2010 and 2022 show visible changes. By 2022, many European countries exhibited a marked improvement in their scores, with a general trend of progression towards the darker shades, indicating higher scores. This improvement suggests that there has been a concerted effort across the continent to address the goals set out by the SDGs, resulting in higher overall performance.

The analysis allowed for exploring not just the extent of the changes, but also how these two key indicators of progress – the EGDI and the SDG indexes – interact and possibly influence one another over time. Table 7.1 reveals pronounced

positive correlations between EGDI 2010 and Goals 3 (Good Health and Well-being), 5 (Gender Equality), 9 (Industry, Innovation, and Infrastructure), and 16 (Peace, Justice, and Strong Institutions). Notably, Goal 9 emerges with a striking correlation coefficient of 0.81, signalling a potent alignment between e-government development and initiatives aimed at building resilient infrastructure, promoting sustainable industrialisation and fostering innovation. These strong positive correlations suggest that advancements in e-government can significantly bolster efforts towards achieving these critical goals, highlighting the transformative potential of digital governance in enhancing public health, ensuring gender equality, driving sustainable industrial and infrastructural development, and fortifying the foundations of peace and justice. Conversely, the findings highlighted strong negative correlations between the EGDI and Goals 12 (Responsible Consumption and Production) and 13 (Climate Action). This inverse relation indicates that higher achievements in these environmental objectives might coincide with lower levels of e-government development, suggesting a potential reallocation of priorities or resources away from digital governance in favour of environmental sustainability. Other SDGs show weaker or moderate correlations.

Furthermore, the analysis for 2022 (Tab. 7.2) Goals 3 (Good Health and Well-being), 4 (Quality Education), 5 (Gender Equality), and 16 (Peace, Justice, and Strong Institutions) exhibit very strong positive correlations with the EGDI, with Goal 3's correlation being particularly notable at 0.70. This suggests a robust link between e-government development and advancements in health, education, gender equality, and the establishment of just societies, reinforcing the idea that digital governance mechanisms can significantly contribute to these areas.

**Table 7.1.** The relation between EDGI index and SDG index score and SDGs indexes (2010)

Scores	EGDI 2010
SDG Index Score	0.58***
Goal 1 Score	0.23
Goal 2 Score	0.26
Goal 3 Score	0.69***
Goal 4 Score	0.29
Goal 5 Score	0.69***
Goal 6 Score	0.36 <sup>^</sup>
Goal 7 Score	0.20
Goal 8 Score	0.57**
Goal 9 Score	0.81***
Goal 10 Score	0.28
Goal 11 Score	0.53**
Goal 12 Score	-0.68***
Goal 13 Score	-0.66***
Goal 14 Score	0.16
Goal 15 Score	-0.23
Goal 16 Score	0.61***
Goal 17 Score	0.55**

Annotation: <sup>^</sup> result at the level of statistical tendency;  $0.05 < p < 0.1$ ; \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ ; strength of correlation: 0.1-0.3 – weak correlation; 0.3-0.5 – moderate correlation; 0.5-0.7 – strong correlation; 0.7-0.9 – very strong correlation; >0.9 – nearly perfect and perfect correlation.

Source: own elaboration.

**Table 7.2.** The relation between EDGI index and SDG index score and SDGs indexes (2022)

Scores	EGDI
SDG Index Score	0.53**
Goal 1 Score	0.09
Goal 2 Score	-0.40*
Goal 3 Score	0.70***
Goal 4 Score	0.66***
Goal 5 Score	0.67***
Goal 6 Score	0.23
Goal 7 Score	0.42*
Goal 8 Score	0.17
Goal 9 Score	0.63***
Goal 10 Score	0.29
Goal 11 Score	0.45*
Goal 12 Score	-0.63***
Goal 13 Score	-0.47**
Goal 14 Score	0.31
Goal 15 Score	-0.20
Goal 16 Score	0.66***
Goal 17 Score	0.49**

Annotation:  $0.05 < p < 0.1$ ; \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ ; strength of correlation: 0.1-0.3 – weak correlation; 0.3-0.5 – moderate correlation; 0.5-0.7 – strong correlation; 0.7-0.9 – very strong correlation;  $> 0.9$  – nearly perfect and perfect correlation.

Source: own elaboration.

Moreover, Goal 9 (Industry, Innovation, and Infrastructure) continues to show a strong positive correlation with the EGDI (0.63), indicating a sustained emphasis on the synergy between e-government and the fostering of innovation and resilient infrastructure. Goals 2 (Zero Hunger) and 12 (Responsible Consumption and Production) stand out with significant negative correlations, -0.40 and -0.63, respectively. The strong negative correlation with Goal 12 is particularly striking, and could suggest a potential divergence between e-government development and sustainability practices in consumption and production. Goal 13 (Climate Action) also exhibits a notable negative correlation (-0.47), indicating a challenging relation between e-government development and climate action efforts. It is worth mentioning that other goals show a range of correlations from moderate to weak, indicating a complex relation between e-government development and these SDGs. Note Goal 17 (Partnerships for the Goals) with a correlation of 0.49, suggesting that e-government might play a role in enhancing partnerships for sustainable development.

## 7.5. Discussion and Conclusions

In the evolving landscape of global governance and sustainable development, the role of e-government stands out as both a catalyst for, and a mirror of broader societal goals. What results from e-government survey, digital government fosters collaboration, connection and sustainable development, and progress in e-government contributes to the achievement of many SDGs (United Nations, 2022). The authors' analysis, drawing upon the correlations between the EGDI and the SDGs, unveils a complex tissue of relations which underline the multifaceted impact of e-government initiatives. The relation between e-government development

and other SDGs exhibits a spectrum of weaker or moderate correlations, pointing to a more ambiguous and context-dependent interplay. These varied correlations imply that the impact of e-government on certain sustainable development objectives may be influenced by a constellation of other factors, including but not limited to policy frameworks, institutional capacities, societal norms, and economic conditions. The complex nature of these correlations emphasises the difficulty of aligning e-government strategies with the diverse and sometimes competing goals of sustainable development.

While the overall trajectory towards the SDGs appears positive, indicating advancements in areas such as quality of life, gender equality, and sustainable cities, the uneven progress across different regions stresses the need for targeted strategies. It is imperative to understand the underlying factors contributing to these disparities to support lagging regions and ensure that the progress is inclusive and sustainable. Looking towards the future, the SDG index serves not only as a measure of where we are, but also as a signpost for where we need to direct our collective efforts to achieve a sustainable future for all.

It can be said that the intricate web of correlations between e-government development and the SDGs highlights the dual role of digital governance as both a driver and as a reflection of societal progress towards sustainable development. The strong positive correlations with specific goals emphasise the potential of e-government to contribute meaningfully to the advancement of health, equality, innovation, and justice. Meanwhile, the negative correlations with environmental goals and the varied relations with other objectives call for a comprehensive, integrated approach which carefully navigates the synergies and trade-offs inherent in the pursuit of a sustainable future. Moving forward, it is imperative that policy-makers, practitioners, and scholars alike embrace a holistic perspective which recognises the complex, dynamic interrelations between e-government and sustainable development, ensuring that the digital transformation of governance serves not only the needs of efficiency and inclusivity but also the underpinning imperatives of sustainability.

The findings of this study highlight the imperative for a more in-depth examination of the intricate relations between e-government development and the SDGs. Future research could focus on identifying mediating factors such as public policies or education that influence this relationship. Understanding the conditions necessary for e-government to support sustainable development effectively is crucial. Future studies should also examine the long-term impacts of e-government and its integration with other sustainability initiatives.

## Appendix. Descriptive Statistics for the Quantitative Variables in 2010 and 2022

2010	<i>M</i>	<i>Me</i>	<i>SD</i>	<i>Sk.</i>	<i>Kurt.</i>	<i>Min.</i>	<i>Max.</i>	<i>W</i>	<i>p</i>
SDG Index Score	77.14	76.65	3.21	0.64	0.96	70.40	84.80	0.95	0.168
Goal 1 Score	99.33	99.50	0.80	-2.31	7.33	96.20	100	0.77	< 0.001
Goal 2 Score	66.02	66.30	5.16	-0.49	-0.41	54.60	73.50	0.96	0.270
Goal 3 Score	88.05	90.25	6.32	-0.80	-0.54	74.80	95.40	0.89	0.005
Goal 4 Score	95.87	96.35	3.41	-2.55	9.46	81.80	99.80	0.78	< 0.001
Goal 5 Score	70.88	70.95	10.67	0.02	-0.38	48.10	90.30	0.98	0.818
Goal 6 Score	82.34	85	10.51	-1.59	2.82	48.80	95	0.86	< 0.001
Goal 7 Score	77.08	74.65	9.02	0.88	0.98	59.10	99.50	0.93	0.038
Goal 8 Score	80.16	81.15	4.82	-0.60	-0.40	68.50	86.20	0.92	0.034
Goal 9 Score	66.98	70.40	17.78	-0.08	-1.40	34.60	95.80	0.92	0.030
Goal 10 Score	88.18	88.40	9.86	-0.13	-1.61	73.40	100	0.88	0.002
Goal 11 Score	86.84	87.80	5.11	-0.63	0.95	73.10	96.60	0.96	0.270
Goal 12 Score	57.34	55.45	12.81	0.06	-0.66	35	80.90	0.97	0.456
Goal 13 Score	63.75	64.50	15.82	-0.94	1.43	17.70	89	0.94	0.073
Goal 14 Score	52.31	60.25	27.99	-1.06	-0.09	1	90.80	0.81	< 0.001
Goal 15 Score	79.67	79.35	11.64	-0.41	-0.52	54.20	97.90	0.97	0.444
Goal 16 Score	80.16	80.60	8.38	0.02	-1.13	67.50	95.80	0.95	0.191
Goal 17 Score	61.09	61.30	10.98	0.86	1	44.60	91.80	0.95	0.130
EGDI	0.66	0.67	0.08	0.29	-1.16	0.55	0.81	0.93	0.059

2022	<i>M</i>	<i>Me</i>	<i>SD</i>	<i>Sk.</i>	<i>Kurt.</i>	<i>Min.</i>	<i>Max.</i>	<i>W</i>	<i>p</i>
SDG Index Score	80.48	80.45	2.81	0.25	0.43	74.60	86.80	0.97	0.573
Goal 1 Score	99.43	99.50	0.56	−1.44	3.25	97.50	100	0.86	0.001
Goal 2 Score	66.75	67.60	4.98	−0.64	0.18	53.50	74.30	0.96	0.292
Goal 3 Score	91.20	92.75	4.94	−0.92	−0.02	79.30	97.10	0.90	0.010
Goal 4 Score	95.86	97.65	5.03	−2.35	4.97	79.50	99.80	0.66	< 0.001
Goal 5 Score	79.53	79.80	9.45	−0.56	−0.01	55.10	94	0.96	0.277
Goal 6 Score	83.01	85.40	10.25	−1.80	3.78	48.70	95.10	0.83	< 0.001
Goal 7 Score	79.58	77.20	9.40	0.41	0.81	56.50	99.60	0.93	0.043
Goal 8 Score	83.70	84.40	3.25	−1.09	1.55	73.80	88	0.92	0.035
Goal 9 Score	85.62	86.95	9.29	−0.37	−0.92	66.20	97.60	0.94	0.086
Goal 10 Score	87.84	89.45	11.39	−1.29	2.30	51	100	0.89	0.004
Goal 11 Score	88.53	89.70	5.68	−0.83	1.65	73.40	99.10	0.93	0.046
Goal 12 Score	58.38	58.50	11.71	−0.07	−0.95	37.70	79.20	0.97	0.548
Goal 13 Score	67.12	70.30	14.58	−1.16	2.05	20.70	87.20	0.92	0.028
Goal 14 Score	57.26	67.55	30.16	−1.20	−0.02	1	87.90	0.76	< 0.001
Goal 15 Score	81.88	82.25	10.45	−0.61	0.14	54.40	97.80	0.96	0.327
Goal 16 Score	81.90	81.60	8.22	−0.34	−0.90	64.90	93.80	0.96	0.254
Goal 17 Score	67.53	67.35	10.46	0.59	0.07	51.30	94	0.96	0.333
EGDI	0.87	0.87	0.05	−0.02	−0.57	0.76	0.97	0.97	0.648

*M* – mean; *Me* – median; *SD* – standard deviation; *Sk.* – skewness; *Kurt.* – kurtosis; *Min.* – minimum; *Max.* – maximum; *W* statistic and p-value (*p*) for the Shapiro-Wilk test.

Source: own elaboration.



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