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Chapter: Emergent Perspectives on Green Skills: Driving Change for a Sustainable Future

RENEWABLE ENERGY, CLIMATE CHANGE, AND SUSTAINABLE DEVELOPMENT NEXUS IN AN ERA OF GLOBALISATION. THE ROLE OF GLOBAL GOVERNANCE

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Annotation. Globalisation, facilitated by foreign direct investment, is leading to an increase in energy consumption, particularly of non-renewable sources, resulting in detrimental environmental effects. Globalisation promotes the use of renewable energy sources, and carbon emissions start to decline, sustaining economic and social development. This study sets out to assess the influence of global governance on environmental sustainability and its implications upon economic and social development in the era of globalisation. In this respect, advanced methodological approaches are applied, namely the structural equation model (SEM), to model longitudinal data collected from the period between 2002 and 2021 within 27 Member States of the European Union. The results highlight that the EU-27 countries must prioritise the globalisation process, as it has the potential to reduce CO2 emissions, with the EU-27 countries being in need for tailored policies and strategies that can effectively combat environmental degradation by exchanging and implementing environmentally friendly technologies.

Keywords: renewable energy, sustainable development, globalisation, global governance.

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JEL classification: Q54, Q56, F63, F64, G34.

Introduction

Globalisation has consistently acted as a catalyst for large-scale economic expansion. Important elements of globalisation, such as trade openness and foreign direct investment, have also greatly contributed to economic growth. While some countries have reduced tariffs to promote economic development, others have declared their ports duty-free zones. Urbanisation rates have increased due to the process of globalisation, which has caused a boost in energy demand. According to recent studies, the fast rate of urbanisation demands an equal rise in energy use. Most emerging nations have resorted to ecologically hazardous fossil fuels to meet their rising energy needs since they are more affordable than renewable energy sources.

Economic globalisation has had numerous effects, such as the diffusion of cultural norms, social values, work opportunities, economic expansion, climate impacts, foreign expenditures, and trade liberalisation. Economic globalisation has benefited both developed and developing countries in the twenty-first century. However, in addition to these benefits, developing countries have also had to contend with drawbacks. Scholars are debating the influence of globalisation on climate change in great detail. Some argue that globalisation is a threat to the environment because of greenhouse gas emissions (GHS). However, others claim that this phenomenon has aided in developing technical innovations that lower greenhouse gas emissions. According to Destek and Ozsoy (2015), globalisation is thought to have a social and economic impact on rising carbon emissions. At the same time, political globalisation is seen to have enhanced the quality of the environment in central and eastern Europe. Moreover, a series of measures need to be implemented by the policymakers in order to achieve climate neutrality and combat climate change worldwide (Manta *et al.,* 2023).

Furthermore, new research suggests that although renewable energy has little effect on trade openness, it has a detrimental effect on air quality and foreign direct investments. In contrast, trade openness has no discernible impact on air pollution, whereas foreign direct investment is associated with higher carbon emissions. When it comes to indirect impacts, trade openness has a favourable indirect influence on carbon emissions from renewable energy. In contrast, foreign direct investment presents a negative indirect effect on carbon emissions. These results indicate that the consequences of globalisation determinants on environmental sustainability vary depending on the recipient nation (Derindag *et al.,* 2023).

Within this framework, the article aims to explore and identify the influences of global governance on environmental sustainability and its implications on economic and social development, considering the era of globalisation within the EU-27 MS from 2002 to 2021. Consequently, a detailed analysis is designed to enhance the current specialised literature with a reinforced and comprehensive evaluation of the interlinkages between global governance, renewable energy and sustainable development, economic and social development, and globalisation by employing econometric methods and modern techniques, namely, structural equation modelling (SEM), for ensuring robust and complex findings. In addition to this, our study enhances multiple and varied strands of thought, contributing to the increase of awareness of the fundamental and crucial role of climate change processes and impact on multidimensional facets (sustainable development, renewable energy, globalisation, and global

governance). Nevertheless, our main findings allow the identification of important instruments, alongside policies, measures, and strategies that need to be fulfilled within a suited framework at the level of the Member States of the European Union, thus supporting the use of renewable energy and the presence of proper governance in maintaining economic and social development in the context of globalisation. The main results underline the significant effects of global governance on achieving sustainable growth within European Union countries and its reflections on human and economic welfare.

The structure of the paper includes a first section that introduces the research topic and highlights the main research objectives of the paper. The second section provides an extended literature review covering the importance of globalisation in addressing environmental challenges and its impact on financial growth, the role of foreign investors in supporting environmental concerns, and the contribution of human capital in achieving both environmental sustainability and economic development. The third section provides information on the database covered by the empirical analysis and the methodological approach. The fourth and fifth sections summarise the main findings of the empirical analysis and outline the concluding remarks of the present study

1. Literature Review

The rapid growth of developing countries offers a plethora of business prospects and fuels the need for energy, leading environmental deterioration. However, with the intention of fulfilling their energy needs, countries are spending more money on environmentally friendly programs that shift from fossil fuels to renewable energy sources. This change makes financial support for green technology necessary, which paves the way for sustainable growth. But this shift presents a major problem for developing countries, where funding green projects is risky for a variety of reasons, such as scarce government support, high investment costs, and energy poverty, among other things that are meant to lessen dependency on fossil fuels.

Energy demand is increasing due to the rapid growth of the industrial revolution and globalisation. This surge in energy demand has significant implications for the environment. There are two divergent viewpoints concerning the effects of environmental globalisation. On the one hand, the increase in carbon emissions caused by globalisation is bad for the environment. On the other hand, others argue that globalisation may benefit the environment by introducing countries to clean technology and other elements that promote environmental sustainability.

As the global population reaches 8 billion, the demand for energy and production is rising, predominantly sourced from non-renewable resources. The continuous reliance on non-renewable energy has had a detrimental impact on the environment, leading to the issue of global warming. This means that we, as a nation, must find solutions to become environmentally and economically sustainable. Sustainability is a complex subject that must be addressed by all EU-27 nations. Moreover, sustainability is closely linked to ethical principles, which may vary depending on factors such as religious beliefs but ultimately converge on the importance of upholding certain core values. We maintain that sustainability is not a concept for the self-centred; instead, it is a lifestyle choice, a mindset to be passed down to future generations to ensure the realisation of their aspirations (D'Adamo *et al.,* 2022).

Political initiatives are essential to guide Europe across all sectors towards this transition, with particular attention given to supporting the most disadvantaged areas. However, a delicate balance must be maintained, as resources should not be reallocated from successful countries to those unlikely to make

a significant difference. Europe is being called upon to enhance assistance for the most impoverished nations worldwide while simultaneously striving for global advancement. Sustainable progress can only be attained through collective efforts. In order to successfully tackle this formidable task, it is imperative to advocate for the notion of shared value, extending its reach beyond future generations to encompass those currently facing limited growth prospects. Sustainable economic growth necessitates prompt action, with the goals of COP26 urging policymakers to curb economic exploitation by certain influential entities that exploit natural resources inappropriately, leading to widespread social deprivation (D'Adamo *et al.,* 2022).

Political globalisation refers to the process of countries entering into international agreements and adhering to regulations, which can be used as a metric to gauge the spread of a nation's policies and its capacity to undertake international political collaborations. Consequently, political globalisation encourages active participation in global affairs and the fulfilment of international commitments, including achieving environmental objectives. To address the global commitment of combating global warming, countries are required to actively promote the conversion to renewable energy sources and foster the generation of sustainable energy solutions. The disregard of these dimensions of globalisation may result in a partial and inaccurate evaluation of the impact of globalisation on the advancement of renewable energy (Nan *et al.,* 2023).

Economic globalisation involves the interchange of resources, intermediary commodities, technology, and the mobility of goods. Global firms may impart their knowledge of environmentally friendly technologies to nations that enforce strict environmental laws. Likewise, economic globalisation, economic expansion, and urbanisation are all influenced by one another. Research suggests that the use of natural resources and the presence of economic globalisation can promote trade openness. However, the previous association was primarily one-sided. Furthermore, the relationship between economic expansion and natural resources is less one-sided. There is a clear indication of a robust two-way connection regarding urbanisation and natural resources, and between urbanisation and economic globalisation (Xiaoman *et al.,* 2021).

Ahmed *et al.* (2020) and Zafar *et al.* (2020) indicate that economic growth, industrialisation, and urbanisation stimulate the exploration of natural resources, leading to environmental degradation. Economic development can be significantly triggered by quality public governance (Costea *et al.,* 2022) and entails the exploitation of resources to boost economic activities, which in turn exerts pressure on the environment and escalates waste production. Urbanisation contributes to higher demands for housing, transportation, and energy, thereby driving up fossil fuel consumption and CO_2 emissions. However, urbanisation has the capacity to mitigate pollution levels by stimulating resource productivity by promoting collective transportation systems such as trains and buses (Xiaoman *et al.,* 2021).

To further address the understanding of this topic, in their study, Nan *et al.* (2023) use globalisation as a mediator to examine the direct and indirect impact of renewable energy on CO_2 emissions, using the mediation model. Several studies use trade openness and foreign direct investment as globalisation indicators. To achieve sustainable development, advocating for green finance is crucial. To accomplish this, financial institutions must actively support environmentally friendly investments. This is particularly significant, for these countries are interconnected through shared boundaries. The findings demonstrate once more the beneficial indirect impact of trade openness and renewable energy usage on carbon emissions. Adopting high-emission technology within a nation is made possible by trade openness. Strict

laws controlling the EU-27 trading system must be put into place. The commerce sector must be given more attention to limit the spread of high-emission technology.

Foreign investors are crucial in promoting environmental quality in the EU-27 countries. To effectively harness their potential, it is essential to focus on foreign direct investment (FDI) and encourage them to support clean energy utilisation within the EU. However, it is equally important to implement stringent measures to regulate the influx of these foreign investors, preventing any misuse of the freedom granted to them and ensuring they do not contribute to increased carbon emissions. These initiatives align with the binding objective of reducing greenhouse gas (GHG) levels across the board and by at least 40% by 2030, relative to 1990 levels (European Council, 2014). Additionally, as part of the EU's commitment to attain climate neutrality by 2050, the European Commission has proposed an EU-wide objective of lowering net GHG emissions by at least 55% by 2030, relative to 1990 levels (European Commission 2020). With the purpose of achieving its goal of having a net-zero GHG emissions economy by 2050, the EU Green Deal aims to accelerate decarbonisation activities inside the EU in the upcoming years (European Commission, 2020).

The Sustainable Development Goals (SDGs) progress report highlights the importance of green investments and the application of cutting-edge green energy technology to achieve the goals of the SDGs (Sheraz *et al.,* 2022). The impact of globalisation (GB) on financial development (FD), energy consumption (EC), human capital (HC), GDP, and CO_2 emissions has not been considered in recent research. While GB mitigates the consequences of CO_2 emissions, it also increases energy consumption and CO_2 emissions. In addition, GB makes financial transactions easier through trade and investments (Green Investment). Moreover, European countries are severely affected by the energy crisis. Thus, the promotion of sustainable development is essential and depends mainly on both geopolitical and climate factors (Su *et al.,* 2023).

When it comes to fostering environmental sustainability and accelerating economic growth, human capital (HC) is essential. According to Hatemi and Shamsuddin (2016), a workforce with higher levels of education and competence tends to use natural resources and financial services more efficiently. Furthermore, human capital promotes environmental consciousness, which results in adopting environmentally friendly behaviours such as recycling and energy saving (Ahmed *et al.,* 2020). As stated by Zafar *et al.* (2019), nations with highly educated and skilled labour markets are more likely to adopt sustainable practices to use natural resources and reduce energy insecurity. Moreover, HC enables communities to implement energy and environmentally efficient solutions (Sheraz *et al.,* 2022).

2. Data and Methodology

2.1 Dataset and Variables' Selection

Data collected and variables selected reflect the main objective of this research, namely, to analyse the effects of global governance and renewable energy on the achievement of sustainable development, as measured by the progress of human development in different aspects, namely in healthcare, education, and knowledge, or living standards, as measured by the Human Development Index (HDI). The complete set of indicators was extracted from various relevant databases found at the World Bank, International Energy Agency (IEA), the US Energy Information Administration (EIA), KOF Swiss Economic Institute, Human Development Report, and the Worldwide Governance Indicators. We analysed the influence of public governance and sustainable development, such as renewable energy, responsible consumption

of resources, or the pollution generated by each EU country, on achieving economic and social welfare, using Stata software for our statistical measurements. The indicators for 27 EU countries were selected as follows, covering the period between 2002–2021:

- Renewable energy indicators/Sustainable development: electricity production from renewable sources (EPRS), renewable power capacity (RPC), fossil fuels electricity generation (FFEG), hydroelectricity generation (HG), greenhouse gas emissions (GGE);
- Globalisation indicators: economic globalisation index (EGI), political globalisation index (PGI), social globalisation index (SGI);
- Governance indicators: government effectiveness (GE), rule of law (ROL), regulatory quality (RQ);
- Economic and social development: Human Development Index (HDI).

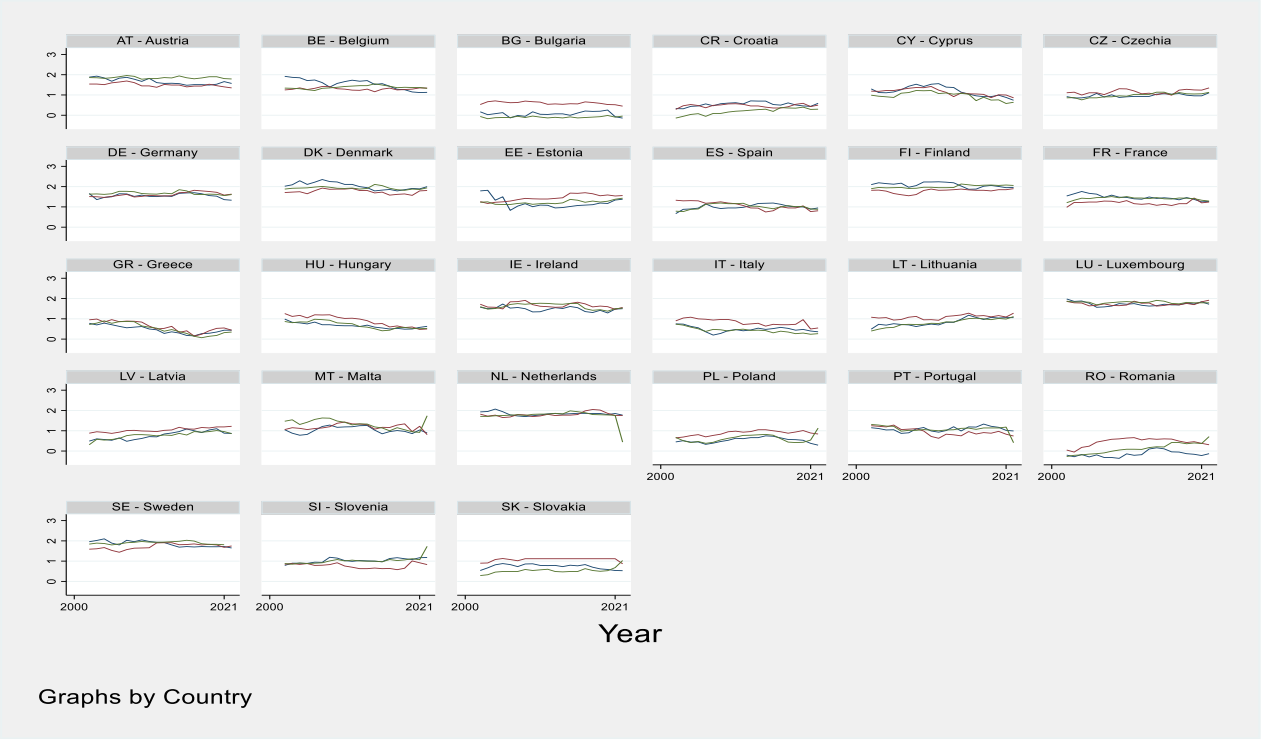
The descriptive statistics of the indicators selected for the analysis are highlighted in *Table 1*.

Table 1. Descriptive Statistics of the Indicators Selected for the Analysis, EU-27, Period 2002–2021

	(1) Count	Mean	Standard deviation (SD)	Min	Max
GE	540	1.1000	0.5957	-0.3597	2.3539
RQ	540	1.1754	0.4335	-0.0518	2.0507
ROL	539	1.0920	0.6109	-0.2656	2.1296
HDI	532	0.8637	0.0458	0.7240	0.9550
EPRS	540	7.5315	3.4410	-18.4206	13.0177
RPC	540	0.9490	2.2101	-10.8434	4.9255
FFEG	540	2.8037	1.5354	-1.3862	5.9243
HG	500	0.9303	2.3620	-4.6051	4.3609
GGE	540	11.0488	1.3488	7.5363	13.7778
EGI	540	4.3605	0.0995	3.9504	4.5387
PGI	540	4.4540	0.1361	3.9188	4.5909
SGI	540	4.4030	0.0699	4.0921	4.5247
N total	**540**				

Source: authors' calculations in Stata 18.

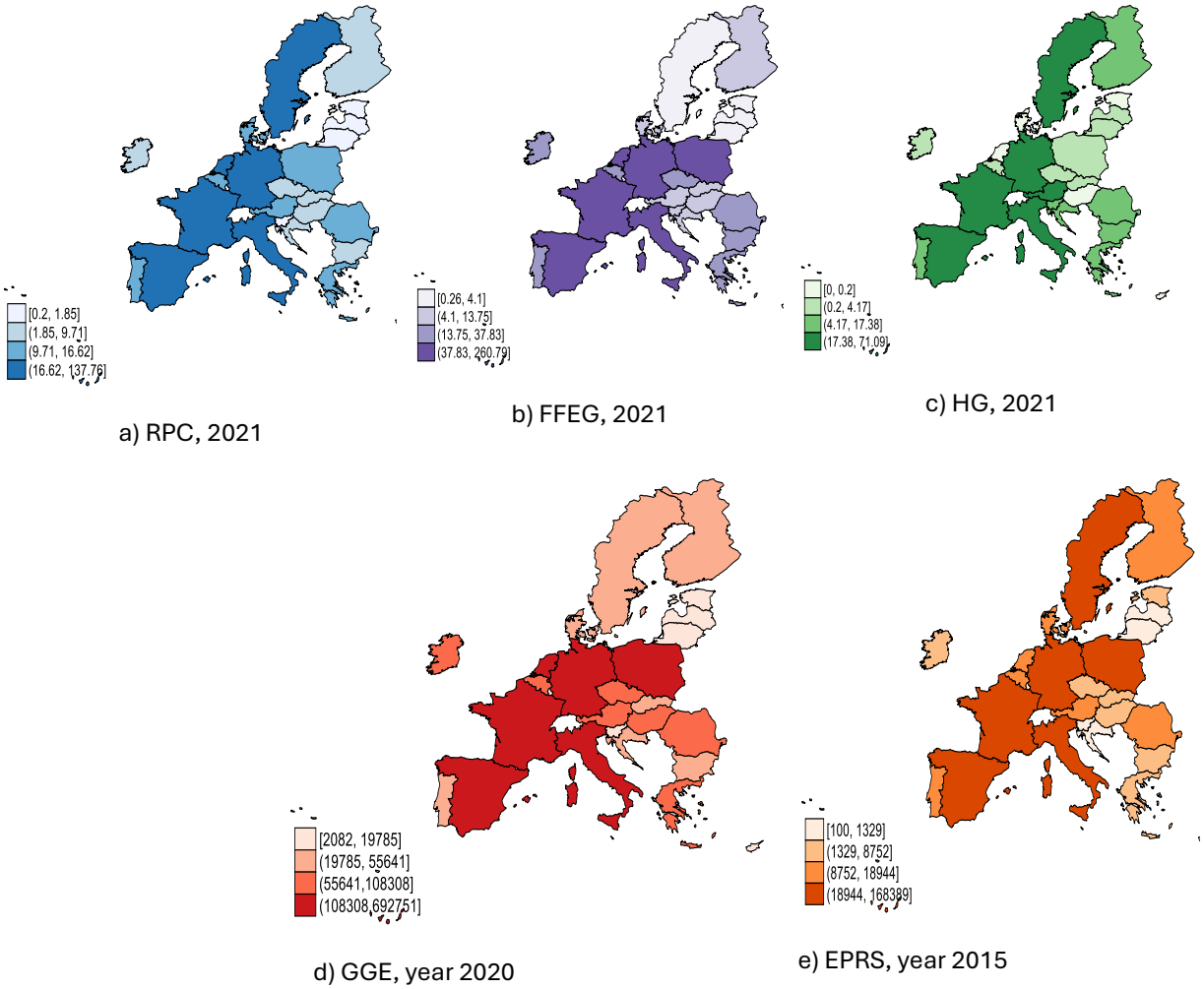
Figure 1 presents the fluctuations of the indicators selected for the empirical research that reflect the governance performance of each EU country between 2002 and 2021. In the European Union, we identified countries such as Luxemburg, Netherlands, Denmark, Finland, and Sweeden with high efficiency in terms of governance, considering the high values registered by the government effectiveness (GE), rule of law (ROL) and regulatory quality (RQ) in the period 2002–2021, as also highlighted by Lobonț *et al.* (2023) and Craciun *et al.* (2023). Lower values are registered for Romania, Slovakia, Hungary, and Latvia, suggesting that in the future, these countries should focus on introducing proper regulations and improving the quality of public services, actions that will generate more credibility for the government's commitment to economic growth and social development.



Source: authors' contribution in Stata 18.

Figure 1. **Graphs by Countries, Global Governance Indicators, EU-27, 2002–2021**

To visually illustrate the performance of countries in relation to renewable energy consumption and sustainable development, *Figure 2* illustrates the maps for each of the indicators selected in the empirical analysis. The maps present the intensity of the results by highlighting, with darker colours, the countries with a higher level of performance in terms of environmental sustainability. It can be observed that the highly developed countries, such as Italy, Spain, France, Germany, and Norway, present high levels of performance in terms of renewable energy indicators and sustainable development for most of the indicators, suggesting that these countries have adopted adequate governance strategies and have already implemented suitable environment-related technologies. Renewable power capacity (RPC) scores highest in Germany, Spain, France, and Italy. On the opposite end, countries such as Malta, Luxembourg, and Cyprus had the lowest levels of RPC in 2021. In the same year, fossil fuels, such as electricity generation (FFEG) and hydroelectricity generation (HG), also registered increased levels in Germany, Italy, Poland, Sweden, and France. The availability of the data allowed the interpretation of the results for greenhouse gas emissions (GGE) from 2020 and electricity production from renewable sources (EPRS) from 2015. Analysing the scores for GGE, it was found that Germany, France, Italy, and Poland are at the top of the list, having the highest values in the European Union. Regarding the EPRS, Germany once more assumes the first place, suggesting that the performances achieved in terms of EPRS, including geothermal, solar, tidal, wind, or biofuels, are very significant.



a) RPC, 2021

b) FFEG, 2021

c) HG, 2021

d) GGE, year 2020

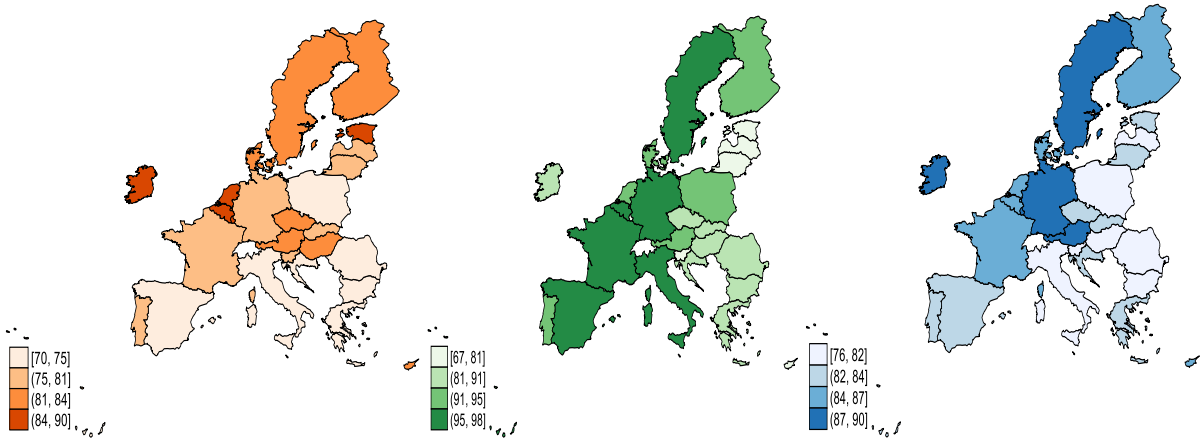
e) EPRS, year 2015

Source: authors contribution in Stata 18.

Figure 2. **Renewable Energy Indicators/Sustainable Development, EU-27**

Figure 3 shows the graphical representation based on the data mapping method for indicators representing globalisation. The economic globalisation index (EGI) registered increased values in the Netherlands, Belgium, and Ireland. At the same time, countries such as Italy, Romania, and Poland were situated at the bottom of the list, after the 27 countries of the European Union.

While studying the political globalisation index (PGI) scores, Germany, France, Italy, and Spain led the ranking, while Malta, Cyprus, and Latvia tended to register lower scores for this globalisation indicator. Moreover, among the EU-27, Luxembourg registers the highest score on the social globalisation index (SGI). At the same time, Romania struggles in this respect, with the lowest score for the spread of ideas, information, images, and people.

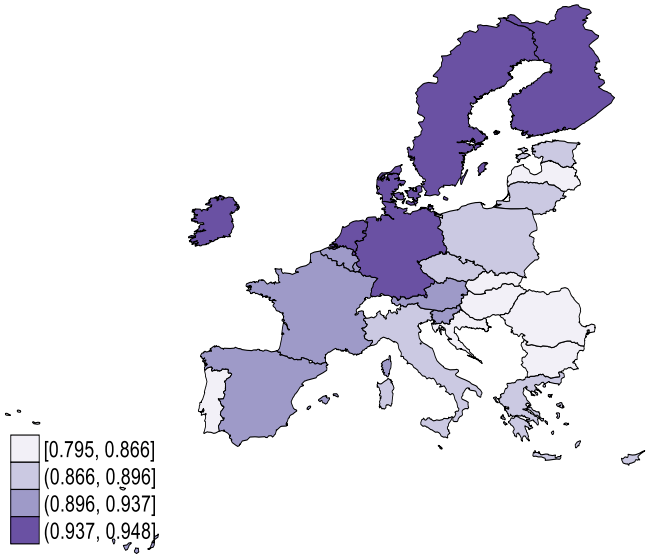


a) EGI 2020 b) PGI 2020 c) SGI 2020

Source: authors' contribution in Stata 18.

Figure 3. **Globalisation Indicators, EU-27**

The human development index (HDI) is an indicator that provides information about the general evolution of human development in multiple aspects, including healthcare, education, and living conditions. The graphical representation of this indicator for 2021 can be found in *Figure 4*. The findings reveal that Denmark, Sweden, Ireland, and Germany presented the highest levels for HDI.



Source: authors' contribution in Stata 18.

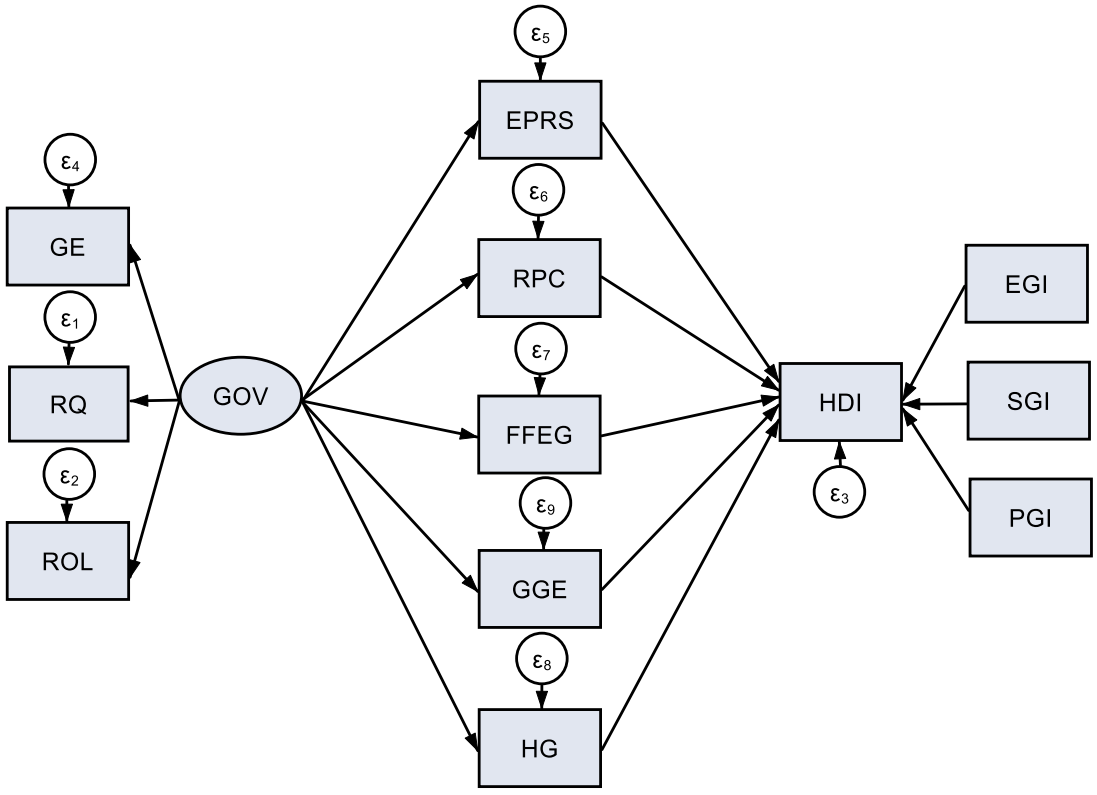
Figure 4. **Economic and Social Development (HDI), 2021, EU-27**

At the same time, Hungary, Romania, and Bulgaria registered the lowest values. This suggests that for these countries, there is a need for improving public governance to support economic development and

provide the proper conditions for improvement while considering the various aspects of human development.

2.2 Methodology

The methodology is based on conducting an SEM analysis to identify the influence of the independent variables, namely the governance and sustainable development indicators, on the dependent variable, namely the economic and social development indicator (HDI). This approach allows us to better understand the connection between the variables, their intensity, and the direction of this influence (positive or negative). As an extension, structural equation modelling permits the realisation of the paths between latent variables that represent constructs that are not directly identified but are formed by other observed variables, for example those extracted from a questionnaire (Streiner, 2006). Therefore, SEM is a methodological technique used as an extension of path analysis, providing the opportunity to measure the correlation between both measured and latent variables (Streiner, 2006). Due to its advantages, SEM is a methodology extensively used for scientific empirical analysis. In this respect, a comprehensive review of the integration of SEM in studies related to sustainable and green supply chain management was performed by Mardani *et al.* (2020). Their findings suggest that most previous studies have integrated SEM into their empirical analysis. An application of SEM can also be identified in a study by Rehman *et al.* (2021) that focuses on embracing green banking practices and uses SEM to identify the connections between the variables.



Source: authors' calculations in Stata 18.

Figure 5. **Structural Equation Modelling (SEM) – General Configuration**

Based on the comprehensive existing literature and in line with our general research objective, we designed an SEM model (presented in *Figure 5*) to assess the cumulative and multiple direct influences of two dimensions, namely the global governance indicators and environmental performance/renewable energy indicators on economic and social development (HDI).

We aimed to better capture the fundamental role of the quality of global governance and renewable energy/sustainable development in enhancing an increased and more effective human development. Moreover, we considered direct and spillover effects of globalisation through its three-fold dimensions (economic, social, and political captured by the economic globalisation index (EGI), political globalisation index (PGI), social globalisation index (SGI)) on socio-economic welfare and the standard of living of citizens within the EU-27 countries (as proxied by HDI).

This framework constructed global governance (GOV) as a latent variable comprising three representative coordinates, including government effectiveness (GE), rule of law (RL), and regulatory quality (RQ). Environmental performance facets (electricity production from renewable sources (EPRS), renewable power capacity (RPC), fossil fuels electricity generation (FFEG), hydroelectricity generation (HG), greenhouse gas emissions (GGE)) act as mediators between these constructs, thus capturing the direct and indirect effects (positive and negative) of the quality of global governance on human development through the energy derived from natural resources and sustainable development in the context of an era of globalisation.

3. Results

In the SEM model, we tested the cumulative effects of governance and environmental performance indicators on human development, introducing renewable energy and sustainable development dimensions as a mediator of the relationship between global governance and human development while also delving into the impact of globalisation on the human development stages and further means of providing long and healthy life, knowledge and upward standard of living. We employed the SEM method for a panel comprising the 27 European Union countries analysed during the period of 2002–2021. The SEM model was processed using the maximum likelihood estimator (MLE) technique through the *gsem* module of Stata 18 software. *Figure 6* graphically presents the estimations alongside the empirical results, which encompass the total (direct and indirect) effects of the considered variables highlighted in *Table 3*. Moreover, Cronbach's Alpha calculations for scale reliability were applied to the SEM model deployed to establish the validity and robustness of the obtained results (presented in *Table 2*).

Table 2. Results of Cronbach's Alpha Applied for SEM Model, in EU-27, 2002–2021

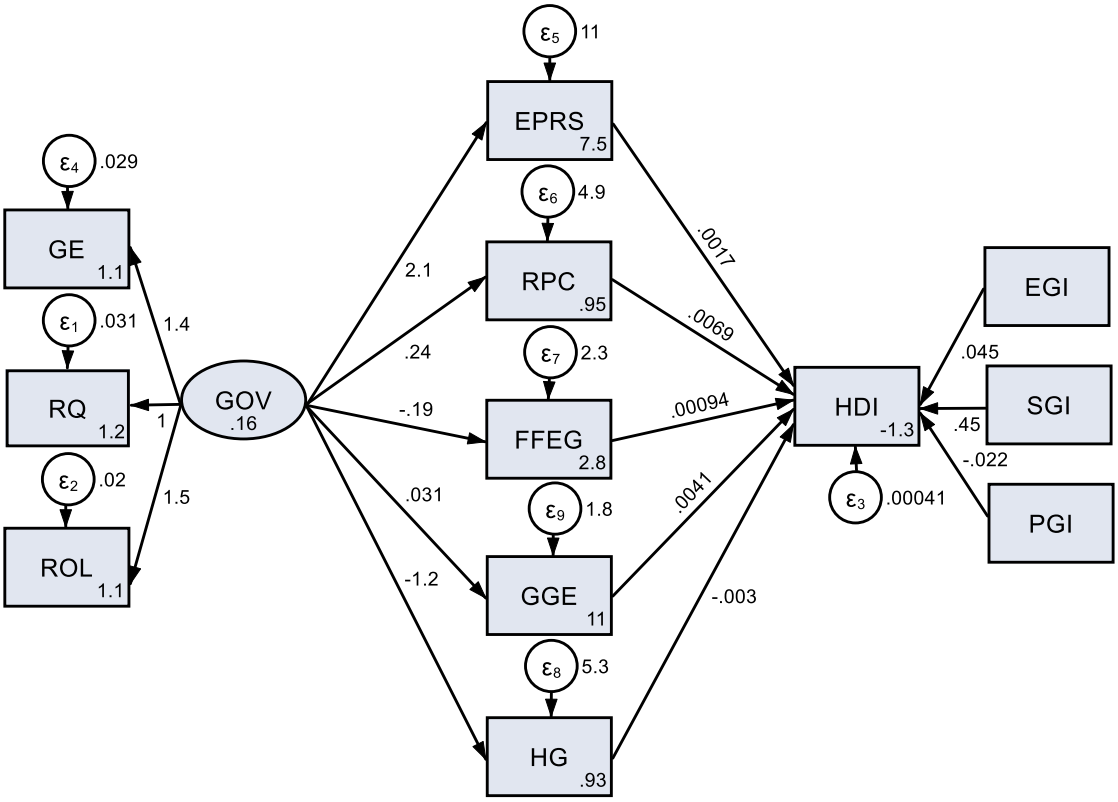
Test Scale = Mean (Standardised Items)				
Average	EU-27			
Item	Obs	Sign	Interitem Correlation	Alpha
GE	540	+	0.2781	0.8091
RQ	540	+	0.2807	0.8110
ROL	539	+	0.2779	0.8089
HDI	532	+	0.2656	0.7991
EGI	540	+	0.3042	0.8278
PGI	540	+	0.3012	0.8258

Table 2 (*continuation*). Results of Cronbach's Alpha Applied for SEM Model, in EU-27, 2002–2021

Test Scale = Mean (Standardised Items)				
Average		EU-27		
Item	Obs	Sign	Interitem Correlation	Alpha
SGI	540	+	0.2888	0.8171
EPRS	540	+	0.2841	0.8136
RPC	540	+	0.3115	0.8327
FFEG	540	+	0.3251	0.8412
GGE	540	+	0.3144	0.8345
HG	500	-	0.3672	0.8646
Total scale				0.8372

Source: author's calculations in Stata 18.

The values of Cronbach Alpha per each item and total scale exceed the 0.7 threshold, thus entailing a strong scale reliability. Also, the estimated coefficients are statistically significant, most of them being at the 0.1% threshold (see *Table 3*). Our results contribute additional evidence to the existing literature and identify the key factors in the role of global governance in environmental sustainability and its implications for economic and social development in the era of globalisation.



Source: authors' calculations in Stata 18.

Figure 6. **Results of SEM Analysis, EU-27, 2002–2023**

Table 3. Estimated Results: SEM Model, EU-27, Period 2002–2021

Variables	GOV	Variables	HDI
RQ		HDI	
GOV	1	EPRS	0.00166*
	(.)		(0.000839)
_cons	1.175***		
	(0.0186)		
ROL		HDI	
GOV	1.499***	RPC	0.00685***
	(0.0337)		(0.00132)
_cons	1.093***		
	(0.0263)		
GE		HDI	
GOV	1.440***	FFEG	0.000941
	(0.0339)		(0.00183)
_cons	1.100***		
	(0.0256)		
EPRS		HDI	
GOV	2.051***	HG	-0.00302***
	(0.370)		(0.000659)
_cons	7.532***		
	(0.148)		
RPC		HDI	
GOV	0.243	GGE	0.00412
	(0.243)		(0.00266)
_cons	0.949***		
	(0.0950)		
FFEG		HDI	
GOV	-0.190	EGI	0.0449**
	(0.169)		(0.0167)
_cons	2.804***		
	(0.0660)		
HG		HDI	
GOV	-1.184***	PGI	-0.0223
	(0.257)		(0.0140)
_cons	0.929***		
	(0.105)		
GGE		HDI	0.452***
GOV	0.0314	SGI	(0.0259)
	(0.149)		
_cons	11.05***		
	(0.0580)		
Var(GOV)	0.157***		
	(0.0113)		
		Var(e.HDI)	0.000412***
			(0.0000262)
N=540			

Note: Standard errors in parentheses*, p < 0.05, ** p < 0.01, *** p < 0.001.

Source: author's calculations in Stata 18.

Looking deeper into the SEM estimations, the favourable and significant importance of the quality of global governance (GOV) is implied, the positive impacts of government effectiveness (GE), regulatory quality (RQ), alongside the rule of law (ROL) on renewable energy and sustainable development.

The results suggest that good citizen perceptions of the quality of public services offered, civil services, in the absence of political pressure, as well as the presence of a solid common framework in terms of the policies and regulations, alongside a high degree of confidence and abiding the rules of society stimulates the production of electricity from renewable sources and, simultaneously, the increase of the capacity of producing electricity by using renewable resources. Positive perceptions and an increased confidence of citizens in the rule of law has a crucial role in stimulating electricity production capacity, guiding renewable energy as the leading source of electricity in the EU-27, especially the supply side of geothermal, tidal, wind, biomass, biofuels and solar.

On the other hand, the quality of good global governance (GOV) tends to have a negative impact on fossil fuel electricity generation (FFEG) and hydroelectricity generation (HG) in the EU-27 Member States. Moreover, the main findings suggest that the most significant negative influence on fossil fuel electricity generation (such as oil, coal, and natural gas) and on hydroelectricity generation is the low ability of governments to design and implement tailored and sound policies and regulations that stimulate the development of the private sector. These results are in line with findings of Saba and Biyase (2022) whose study also revealed a negative statistically significant effect of political stability on renewable electricity advancement within European countries but indicated a statistically insignificant influence of government effectiveness on improving renewable electricity performances. This suggests that within the European countries, there is a need for improvement of the quality of public services oriented towards sustainable development in order to achieve better outcomes regarding the renewable energy generation.

Within the EU-27 countries panel, it can be observed that HDI is favourably influenced, on the one hand, by renewable power capacity (RPC) with a coefficient of 0.00685 (statistically significant at the 0.1% threshold, $p < 0.000$), findings also confirmed by Nguyen *et al.* (2023), which demonstrated a favourable linkage between the adoption of renewable energy and human growth, referring to various aspects such as health, education, and earnings. Moreover, this outcome is based on the cumulative effects of global governance indicators (GE, RQ, and ROL). On the other hand, the most negative influence is observed in the case of HG (a coefficient of -0.00302, statistically significant at 0.1% level, $p < 0.000$). Hydroelectricity generation (HG) is the only indicator that tends to restrict progress regarding human development registered by certain countries of the European Union.

Thus, the adverse effects of HG on HDI tend to be generated by the subsequent impact of global governance (GOV) in the context represented by the agents that do not abide by the rules of law and present a low degree of confidence. Uncertain regulations and policies of the energy sources from natural resources that are in constant change and the credibility of citizens in the formulated and implemented policies that may restrict the access and use of the renewable energy sources to produc.

At the same time, the results show a significant impact of globalisation on human development, revealing positive influences of the economic globalisation index (EGI) (a coefficient of 0.0449, statistically significant at the 1% threshold) and social globalisation index (SGI) (a coefficient of 0.452, statistically significant at the 0.1% threshold) on human development, alongside negative effects of the political globalisation index (PGI), which is not statistically significant. The main findings suggest that representative indicators of globalisation, comprising three essential subdimensions of the KOF Globalisation Index, namely the economic globalisation index (EGI), the political globalisation index (PGI), and the social globalisation index (SGI), induce both mainly positive effects on human development. Therefore, economic globalisation significantly contributes to the increased human development by

offering many opportunities for development within the EU-27 countries. More precisely, economic globalisation stimulates employment opportunities that will further increase investments and trade activities, leading to economic growth that would offer more capacity for investment in fundamental domains, such as health, education, and well-being, as also stated by Ulucak *et al*. (2020). Regarding social globalisation, our results suggest that it is strongly connected with human development, involving various common factors and affecting the health of citizens through changing cultural practices and traditions, modifying diets and food, and even the exchange of information.

Our results align with those obtained by Behera and Sahoo (2023) and Sirgy *et al*. (2004), which also confirm that the mental health of citizens may be affected by changes in cultural practices and interactions. Moreover, regarding the three dimensions of the KOF Globalisation Index, our main findings highlight that the social globalisation index (SGI) has the most significant impact on human development, results that are also sustained by Amavilah (2009). Hence, concerning the social dimension of globalisation, in the long term, it can further increase and sustain the fundamental needs of citizens, such as a healthy life, a quality standard of living, and education. Nevertheless, social globalisation also spurs citizens' knowledge, which is reflected in the years of schooling, quality education, and lifelong learning opportunities through high technology, the information exchange, international students, and civil liberties. In addition, the human development (HDI) is slightly (negatively) affected by the political globalisation index (PGI).

Our research implies that countries may need to increase the number of diplomatic bodies and institutions, the number of distinct treaty partners, international treaties, and the personnel contributing to UN Security Council Missions to continue improving human development and well-being in the EU-27 Member States. The main results also highlight the high dependency between globalisation and human development, which was also confirmed by Goyal and Singh (2023).

Conclusions

Recently, researchers have given significant attention to examining the links between energy resources, renewable energy and its consumption, climate change, and globalisation. Climate change and its impact on global warming have emerged as determinative subjects for academic studies, researchers, and policy makers worldwide. The fundamental basis for this link is relatively straightforward: as countries become more globalised, their energy needs increase. It is widely accepted that as globalisation intensifies, trade barriers diminish, increasing a nation's output and income levels. Consequently, this increase in income and output is accompanied by a surge in energy demand. Given the perception that increased globalisation is associated with higher economic growth, it is commonly recognised that globalisation catalyses the expansion of energy demand (Chien *et al.,* 2021).

The general objective of the present article was to capture the effects of global governance on environmental sustainability and its impact on human development considering the era of globalisation within the EU-27 Member States for the period of 2002–2021. Therefore, an accurate analysis of the EU-27 is configured to capture the inferences between global governance, renewable energy, sustainable development, human development, and globalisation by employing an advanced and integrative econometric approach, namely structural equation modelling (SEM).

Moreover, our study complements multiple and diverse lines of thought, contributing to the growing awareness of the seriousness and crucial significance of climate change processes and their effects on

multidimensional facets (sustainable development, renewable energy, globalisation, and global governance). Nevertheless, our main findings allow the identification of the required mechanisms, alongside policies, measures, and approaches necessary to be fulfilled within an aligned framework at the level of the Member States of the European Union, thus supporting the use of renewable energies and the presence of effective governance in promoting both economic and social development, considering the context of globalisation. The main results underline the significant effects of global governance on achieving sustainable growth within European Union countries and its reflections on human and economic welfare.

Nevertheless, when SEM was applied in an integrative research, we found that agents do not abide by the rules of law and present a low degree of confidence, alongside uncertain regulations and policies regarding the energy sources from natural resources, which are constantly changing, and the credibility of citizens in the formulated and implemented policies that may restrict the access and use of the renewable energy sources to generate electricity. Furthermore, the main results of the SEM estimations highlight the positive correlations between government effectiveness (GE), regulatory quality (RQ), rule of law (ROL) and sustainable development, while human development (HDI) is mostly affected by renewable power capacity (RPC). Regarding the impact of globalisation on social growth (HDI), we acknowledge positive, statistically significant connections between HDI and economic globalisation index (EGI), which may provide favourable circumstances for growth within the EU-27 countries, and social globalisation index (SGI), which may contribute to achieving better standards of living for EU-27 citizens, higher quality education and health care. Thus, our results align with those obtained by Nan *et al*. (2023), who affirm that the presence of highly globalised nations nearby can have a significant impact on globalisation, environmental policies, and various additional aspects of the local country. Additionally, it can shape the perspectives on the environment and the level of investment in renewable energy, ultimately impacting the local country's renewable energy certificates (REC). The main findings also indicate that, in the immediate term, the utilisation of renewable energy and globalisation contribute to the ecological footprint and sustainable development. In contrast, renewable energy is influenced by actual output, and renewable energy, in turn, influences globalisation. Consequently, our findings offer valuable insights for policymakers to contemplate the adoption of renewable energy consumption as the most effective approach to reduce the emissions of pollutants.

Despite the importance of this study in the context of current debates on climate change and globalisation, there are potential areas for further research. Future studies could incorporate additional variables related to globalisation, such as capital formation and tourism, to broaden the scope. The current study did not consider these variables due to its specific objectives. In addition, future studies could involve a broader selection of countries, including exploration at the regional or continental level.

There are also some limitations to this study, including the period considered for the analysis, which captures only a part of the dynamic of the indicators over time. Future research may highlight and include other indicators related to environmental sustainability because the limited number of variables may limit the generalisability of our findings. Overall, the study presents valuable findings for practitioners and researchers and could indicate future governmental focus in terms of regulations for European Union countries.

Literature

Ahmed, Z., Zafar, M. W., Ali, S., Danish. (2020), "Linking urbanization, human capital, and the ecological footprint in G7 countries: An empirical analysis", *Sustainable Cities and Society*, Vol. 55, No 102064, p. 55. https://doi.org/10.1016/j.scs.2020.102064.

Amavilah, V.H. (2009), "National symbols, globalization, and the well-being of nations", *MPRA Paper*, https://ideas.repec.org/p/pra/mprapa/14882.html.

Behera, J., Sahoo, D. (2023), "Does globalization spur human development at income-group and regional levels? evidence from cross-country data", *Asia-Pacific Journal of Regional Science*, Vol. 7, No 4, pp.1395–1436. https://doi.org/10.1007/s41685-023-00298-3.

Chien, F., Ajaz, T., Andlib, Z., Chau, K.., Ahmad, P., Sharif, A. (2021), "The role of technology innovation, renewable energy, and globalization in reducing environmental degradation in Pakistan: A step towards a sustainable environment", *Renewable Energy*, Vol. 177, pp.308-317. https://doi.org/10.1016/j.renene.2021.05.101.

Costea, F., Țaran, A., Lobonț, O. (2022), "Scientific Contextualization of the Public Policy and Entrepreneurship nexus", Ovidius University Annals Economic Sciences Series, Vol. 22, No 1, pp.844–853. https://doi.org/10.61801/ouaess.2022.1.113.

Craciun, A., Țaran, A., Noja, G.G., Pirtea, M.G., Racataian, R. (2023), "Advanced Modelling of the Interplay between Public Governance and Digital Transformation: New Empirical Evidence from Structural Equation Modelling and Gaussian and Mixed-Markov Graphical Models", *Mathematics*, Vol. 11, No 5, p.1168. https://doi.org/10.3390/math11051168.

D'Adamo I., Gastaldi M., Morone P. (2022), "Economic sustainable development goals: Assessments and perspectives in Europe", *Journal of Cleaner Production*, Vol. 354, p.131730. https://doi.org/10.1016/j.jclepro.2022.131730.

Derindag, O.F., Maydybura, A., Kalra, A., Wong, W.-K., Chang, B.H. (2023), "Carbon emissions and the rising effect of trade openness and foreign direct investment: Evidence from a threshold regression model", *Heliyon*, Vol. 9, No 7, e17448. https://doi.org/10.1016/j.heliyon.2023.e17448.

Destek, M.A., Ozsoy, F.N. (2015), "Relationships between economic growth, energy consumption, globalization, urbanization, and environmental degradation in Turkey", *International Journal of Energy and Statistics*, Vol. 03, No 04. https://doi.org/10.1142/S2335680415500179.

European Commission. (2020), "Report from the commission to the european parliament, the council, the european economic and social committee and the committee of the regions", *EU Climate Action Progress Report 2020*, available at, https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2020:0777:FIN:EN:PDF, referred on 02.05.2024.

European Council. (2014), https://data.consilium.europa.eu/doc/document/ST-169-2014-INIT/en/pdf, referred on 27.04.2024.

Goyal, K., Singh, J. (2023), "Political Economy of Globalization and Human Development: Experience from South Asian Countries", in: Adam, H., Rena, R. (eds.), *Political Economy of Development in the Global South Post-COVID-19 Pandemic*, Springer, Singapore. https://doi.org/10.1007/978-981-99-4074-5_3.

Hatemi-J,A., Shamsuddin, M. (2016), "The causal interaction between financial development and human development in Bangladesh", *Applied Economics Letters*, Vol. 23, No 14, pp.995–998. https://doi.org/10.1080/13504851.2015.1128066.

Lobonț, O., Costea, F., Vatavu, S., Li, Z., Țaran, A., Kononenko, I. (2023), "is fiscal policy one of the most important socio-economic drivers for entrepreneurial activity in european union countries?", *Journal of Business Economics and Management*, Vol. 24, No 2, pp.292–314. https://doi.org/10.3846/jbem.2023.19091.

Manta, A.G., Doran, N.M., Badîrcea, R.M., Badareu, G., Țaran, A.M. (2023), "Does the implementation of a Pigouvian tax be considered an effective approach to address climate change mitigation?", *Economic Analysis and Policy*, Vol. 80, pp.1719–1731. https://doi.org/10.1016/j.eap.2023.11.002.

Mardani, A., Kannan, D., Hooker, R.E., Ozkul, S., Alrasheedi, M., Tirkolaee, E.B. (2020), "Evaluation of green and sustainable supply chain management using structural equation modelling: A systematic review of the state of the art literature and recommendations for future research", *Journal of Cleaner Production*, Vol. 249, p.119383. https://doi.org/10.1016/j.jclepro.2019.119383.

Nan, S., Huo, Y., Lee, C.C. (2023), "Assessing the role of globalization on renewable energy consumption: New evidence from a spatial econometric analysis", *Renewable Energy*, Vol. 215. https://doi.org/10.1016/j.renene.2023.118974.

Nguyen, T.T.H., Phan, G.Q., Tran, T.K., Bui, H.M. (2023), "The role of renewable energy technologies in enhancing human development: Empirical evidence from selected countries", *Case Studies in Chemical and Environmental Engineering*, Vol. 8, No 100496. https://doi.org/10.1016/j.cscee.2023.100496.

Rehman, A., Ullah, I., Afridi, F.-A., Ullah, Z., Zeeshan, M., Hussain, A., Rahman, H. U. (2021), "Adoption of green banking practices and environmental performance in Pakistan: A demonstration of structural equation modelling. Environment", *Development and Sustainability*, Vol. 23, No 9, pp.13200–13220. https://doi.org/10.1007/s10668-020-01206-x.

Saba, C.S., Biyase, M. (2022), "Determinants of renewable electricity development in Europe: Do Governance indicators and institutional quality matter?", *Energy Reports*, Vol. 8, pp.13914–13938. https://doi.org/10.1016/j.egyr.2022.09.184.

Sheraz, M., Deyi, X., Sinha, A., Zubair, Mumtaz M.Z., Fatima, N. (2022), "The dynamic nexus among financial development, renewable energy and carbon emissions: Moderating roles of globalization and institutional quality across BRI countries", *Journal of Cleaner Production*, Vol. 343. https://doi.org/10.1016/j.jclepro.2022.130995.

Sirgy, M.J., Lee, D., Miller, C., Littlefield, J.E. (2004), "The impact of globalization on a country's quality of life: Toward an integrated model", *Social Indicators Research*, Vol. 68, No 3, pp.251–298. https://doi.org/10.1023/b:soci.0000033577.34180.4b.

Streiner, D.L. (2006), "Building a better model: An introduction to structural equation modelling", *The Canadian Journal of Psychiatry*, Vol. 51, No 5, pp.317–324. https://doi.org/10.1177/070674370605100507.

Su, C.W., Qin, M., Chang, H., Țaran, A. (2023), "Which risks drive European natural gas bubbles? Novel evidence from geopolitics and climate", *Resources Policy*, Vol. 81, No 103381. https://doi.org/10.1016/j.resourpol.2023.103381.

Ulucak, R., Danish, Li, N (2020), "The nexus between economic globalization and human development in Asian countries: an empirical investigation", *Environ Sci Pollut Res*, Vol. 27, pp.2622–2629. https://doi.org/10.1007/s11356-019-07224-1.

Xiaoman, W., Majeed, A., Vasbieva, D.G., Yameogo, C.E.W., Hussain, N. (2021), Natural resources abundance, economic globalization, and carbon emissions: Advancing sustainable development agenda. Sustainable development, 29(5), 1037-1048. https://doi.org/10.1002/sd.2192

Zafar, M.W., Shahbaz, M., Sinha, A., Sengupta, T., Qin, Q. (2020), "How renewable energy consumption contribute to environmental quality? The role of education in OECD countries", *Journal of Cleaner Production*, Vol. 268. https://doi.org/10.1016/j.jclepro.2020.122149

Zafar, M.W., Zaidi, S.A.H., Khan, N.R., Mirza, F.M., Hou, F., Kirmani, S.A.A. (2019), "The impact of natural resources, human capital, and foreign direct investment on the ecological footprint: The case of the United States", *Resources Policy*, Vol. 63. https://doi.org/10.1016/j.resourpol.2019.101428.

AR VIEŠOJO VALDYMO KOKYBĖ NAUDINGA EUROPOS SĄJUNGOS SVEIKATOS PRIEŽIŪROS SISTEMOMS? SVEIKATOS FINANSAVIMO TARPININKAVIMO VAIDMUO

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Santrauka. Straipsnyje gilinamasi į viešojo valdymo, sveikatos finansavimo ir asmens gerovės pagrindus Europos Sąjungos lygmeniu. Siekiant užfiksuoti sąlyginį netiesioginį sveikatos finansavimo poveikį buvo pasitelktas nuosaikus tarpininkavimas. Sukurti du metodai „iš viršaus į apačią“, kad būtų galima ištirti gero valdymo poveikį sveikatos būklei. Pirmuoju metodu buvo įvertintas kokybiškų viešojo valdymo įgaliojimų poveikis sveikatos būklės sąlygoms. Antruoju požiūriu buvo siekiama nustatyti tinkamiausią būdą pagerinti geresnę ES piliečių sveikatą užtikrinant gerą valdymą ir tarpininkavimo poveikį, susijusį su finansavimo lygiais. Šiame tyrime pasitelktas struktūrinis lygčių modeliavimas ir patikima regresija su Huberiu ir dvisvorio iteracijomis. Jie pritaikyti kaip pažangios ekonometrinės procedūros duomenų rinkiniui, apimančiam 27 ES valstybes nares 2010–2021 m. laikotarpiu. Pagrindinės išvados atskleidžia, kad geresnis viešasis valdymas ir sveikatos finansavimas lemia geresnius ES piliečių sveikatos rezultatus.

Reikšminiai žodžiai: viešasis valdymas; sveikatos sistema; sveikatos išlaidos; gerovė; struktūrinių lygčių modeliavimas.