sciendo

The Green Economy in the Context of Sustainable Development. Study Case: European Union

Florentina-Ștefania NEAGU[*]
Bucharest University of Economic Studies, Romania
[*]*Corresponding author, stefanianeagu15@yahoo.com*

Lidia Lenuța BĂLAN
Ministry of Research, Innovation and Digitization, Romania
lidia.balan@mcid.gov.ro

Ioana IGNAT
Bucharest University of Economic Studies, Romania
ioana.ignat@cig.ase.ro

Marta TACHE
Bucharest University of Economic Studies, Romania
marta.tache@cig.ase.ro

Abstract. *The term „Green economy" in the context of sustainable development was used for the first time in 1989, there is no internationally agreed definition for it. In the last decades, in a relatively short period it has become an issue with major importance worldwide, the society realizing that its actions have direct effects on the environment, its live and where we carry out our work. In order to correctly understand the meaning of Green economy we need an insight on man as an individual but also on organizations that make economic and financial decisions and initiatives.*

This paper examines the EU countries progress toward green economy, identifies the relationship with financial and economic indicators and analyses the role of eco-innovation performance and innovative capacity toward green transition to meet the European Green Deal objectives. Complex theoretical, methodological and empirical research methodology was adopted by using specific methods of investigation: critical analysis of the literature, complex quantitative and qualitative analysis, identification, construction and the appropriate processing of existing databases. The numerical results were obtained by the SPSS software package.

The paper's outcome identifies barriers and success factors in the implementation of the EU's main new growth strategy, highlights that the green transformation process of the economy needs large investments in innovation and eco-innovation and needs the green finance to be covered also by the public and private sector on national and EU level and from the EU budget as well.

Keywords: green economy, european green deal, national accounts, decarbonisation, sustainable development, eco-innovation, innovation.

Introduction

In a green economy, rising incomes and employment are driven by public and private investment that reduces carbon emissions and pollution, increases energy and resource efficiency, and prevents the loss of biodiversity and ecosystem services. These investments must be catalyzed and supported by targeted public spending, reforms and regulatory changes (Economic Commission for Africa and United Nations Environment Program, 2012). Sixteen governments of the industrialized

DOI: 10.2478/picbe-2024-0243

countries, together with the EU, issued a statement in support of the conditions for a fair transition at international level. The new Declaration sets out five principles, including worker support, social dialogue, economic strategies, decent work, supply chains and reporting. The signatories of the declaration represent 70% of public funding for climate (The London School of Economics and Political Science, 2021).

A recent report notes that annual investment in clean energy in emerging and developing markets must increase from $ 150 billion in 2020 to over $ 1 trillion by 2030 to achieve zero net emissions by 2050 (The London School of Economics and Political Science, 2021). The framework for measuring the progress of the green economy is based on three directions: environmental protection, economic development and social development, while protecting the environment.

Short overview of the literature

The GEP Measurement Framework formulated by the United Nations Environment Program (UNEP) to achieve the UN's 17 Sustainable Development Goals (SDGs) and its 169 targets is being used to track the regional progress of the green economy. This framework consists of 19 indicators divided into 3 dimensions, economic, environmental, social, of which 5 come from the economic dimension (green trade, environmental patents, renewable energy, energy consumption, material footprint), 6 from the social dimension (Palma report, gender inequality, social security, education, life expectancy and access to basic services) and 8 of the environmental dimension (air pollution, protected areas, freshwater extraction, land use, ecological footprint, greenhouse gas emissions greenhouse gases, nitrogen emissions and wealth index) (Center for Environmental Management and Policy Analysis, 2020). The European Union is pursuing the evolution of these indicators and achieving the Sustainable Development Goals by 2030 (Eurostat, 2021).

With regard to the Sustainable Development Goals from 2015 to date, the EU has made considerable progress in promoting peace and personal security, access to justice and trust in institutions (Objective 16). Progress has also been made in reducing poverty and social exclusion (Objective 1) and improving the EU's health situation (Objective 3). The assessment of the remaining targets is to some extent already affected by the pandemic, with COVID-19 significantly slowing progress. In the field of the economy and the labor market (Objective 8), the COVID-19 crisis has interrupted the continuous improvement observed since 2013. Similar impacts can be observed in the fields of education (Objective 4), gender equality (Objective 5), other inequalities (Objective 10), as well as global partnerships and means of implementation (Objective 17), where 2020 data show a deterioration for several indicators (Eurostat, 2021).

The main goal of European Green Deal that EU to be climate neutral by 2050 (EC, 2019). In 2019 at the level of the European Union (EU) greenhouse gas emissions reached a very high volume, broken down by main source sectors, it turns out that energy is responsible for 77% of greenhouse gas emissions, including transport represents about a third. Greenhouse gas emissions from agriculture contribute 10.6%, industrial processes and product use by 9.1%, and waste management by 3.3%.

Following the completion of the sixth assessment report of the Intergovernmental Panel on Climate Change (IPCC) in Geneva in August 2021, man-made greenhouse gas emissions are responsible for approximately 1.1 ° C of global warming. at the beginning of the twentieth century and until today. These activities include, for example, burning coal, oil and gas, deforestation and agriculture (IPPC, 2021).

The sustainable mobility is an element of the European Green Deal.The aim of the strategy for sustainable and smart mobility is to cut 90 per cent in emission by 2050 (EC, 2019). Given that

the EU car industry is one of the biggest polluters, it is necessary to decarbonise road transport, which will require a range of emission reduction solutions, not only electrification, but also sustainable renewable fuels such as ethanol (Studio Gear Up, 2021). Experts from Studio Gear Up looked at 16 European countries to see the impact of the full electrification of the car fleet for road passenger transport, the report concluded that the EU risks significantly increasing the cost of purchasing electric vehicles and thus block other economic sectors.

In European countries, the price of cars with electric batteries is close to the price of cars with internal combustion, due to government aid schemes. Currently the most cost-effective option in terms of purchase price but also the degree of pollution is ethanol E85. At EU level, France is the country where E85 superethanol fuel consumption continues to rise, along with the E85 ethanol network of petrol stations. About 25% of France's national gas station network now emits E85 fuel, according to data published by Bioethanol Collective (LPG Autogas Info, 2022).

Environmental protection includes all activities and actions aimed at preventing, reducing and eliminating pollution at EU level, as well as any other environmental degradation. An environmental protection tool has been introduced to achieve the goals of sustainable development, Resource Management which includes the conservation, maintenance and improvement of the stock of natural resources and therefore protection against depletion of natural resources (Eurostat, 2021). A problem for resource management in the European Union is given by the phantom car fleet (Politico, 2018). According to the European Commission, about two thirds of the 10 million cars put out of service in Europe are registered in the authorsities' registers as being erased and scrapped, while about 4 million cars a year are lost. According to EU rules, dismantling companies must remove hazardous substances (engine oil, engine coolant, brake fluid, power steering fluid, etc.), but this is not always the case for missing cars, which means that tons per year. of metal, plastic, rubber, glass and liquids reach the environment (Official Journal of the European Union, 2021).

Among the causes of the disappearance of such a large number of cars are: illegal exports to Middle Eastern countries where an old car can be repaired cheaply, legal loopholes in the sense that a car can be sold in another country but never deleted in the country of origin , and other cars were stolen and never recovered by their owners (Politico, 2018).

At the end of 2021, the European Union allocated more than € 1.1 billion to 7 innovative projects under the Innovation Fund, which aims to bring innovative technologies to market in energy-intensive industries, hydrogen, carbon capture, use and storage and renewable energy. The projects are implemented in Belgium, Italy, Finland, France, the Netherlands, Norway, Spain and Sweden and cover a wide range of sectors relevant to the decarbonisation of various industries and energy sectors in Europe, such as chemicals, steel, cement, refineries and energy and thermal energy. The projects are part of the industrial nodes or of the decarbonisation groups of the interconnected industries.

The Swedish project aims to completely eliminate greenhouse gas emissions from steel production by using renewable hydrogen in the cities of Gällivare and Oxelösund. Finland will test two ways to produce clean hydrogen at a refinery in Porvoo, using renewable energy and capturing carbon dioxide and storing it permanently in the North Sea.

France will implement a project that captures unavoidable emissions in a cement plant and will partially store geological carbon dioxide in the North Sea. To reduce emissions from hydrogen and chemical production, a project in Belgium will develop a full value chain for carbon capture, transport and storage in the port of Antwerp (European Commission, 2021).

McKinsey Sustainability has released a report in 2020 that identifies the sectors that would achieve the goals of reducing emissions faster: energy, as wind and solar power generation technologies are already available worldwide, and energy demand would be double as other sectors switch to electricity and green hydrogen, requiring a rapid increase in the production and storage capacity of renewable sources. Transport because this sector is close to climate neutrality by 2045. As electric vehicles run in all EU countries, it is estimated that it will take about ten years to fully switch to electric vehicles across the European Union.

Buildings and renovations are as well in focus of European Green Deal being responsible for around 40% of the EU's energy consumption and 36% of greenhouse gas emissions from energy (EC, 2019). Buildings, most of the technology needed to decarbonise the building sector is already available, however, renovating parts of the European Union's building stock is a massive action, as the share of homes using renewable heating sources should be to increase from 35% at present to 100%. The industry that is the most expensive decarbonizing sector, the industry would need a technology that is still developing.

The use of more efficient farming practices in agriculture could reduce agricultural emissions, but this is a difficult process, as more than half of agricultural emissions come from raising livestock for food and cannot be reduced without significant changes in meat consumption or progress technological (McKinsey Sustainability, 2020). The Farm to Fork strategy as element of European Green Deal is focused on the reduction of waste (EC, 2019).

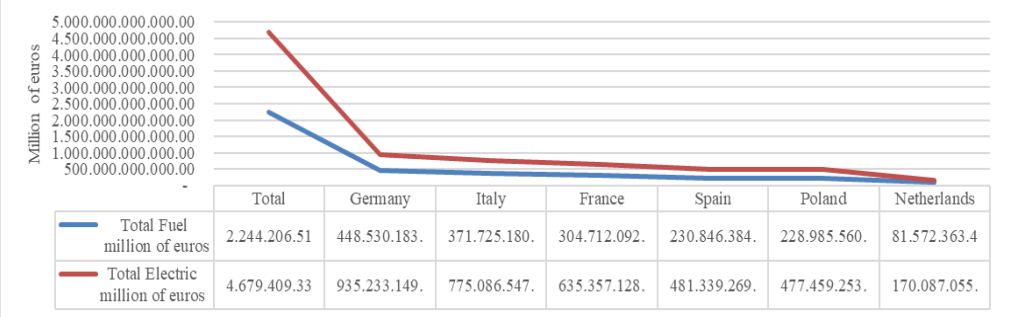
At EU level, the reduction in transition costs has been shown to be driven by four geographical factors that will determine how easy it is for each country to reduce emissions and what decarbonisation measures would be most cost-effective. These factors are: local climate, carbon storage opportunities, local agricultural practices and land available for reforestation, wind farms and solar plants. At present, the countries in the north of the EU meet the four factors and could benefit from 30% - 60% more hours of wind on land than the countries in the south. Southern countries would benefit from another 1.000 hours of sunlight they receive each year (McKinsey Sustainability, 2020).

In order to see what are the acquisition costs at the level of the European Union in 2019 for the 28 countries, in the situation where the fleet of petrol and diesel fuel for electric vehicles is being renewed, the authors carried out the following analysis: from the base Eurostat, Statista and Postbus data selected the categories of vehicles registered more than 10 years old: passenger cars with a maximum capacity of 5 seats, coaches, buses and trolleybuses with a capacity of more than 9 seats, trucks and tractors weighing more than 3.5 tonnes. The analysis for 2019 has been carried out as the reported data are in the final version and the United Kingdom was still a member of the EU.

In order to assess the total acquisition costs at the level of each country, the vehicle with the starting price for the lowest standard equipment for the mentioned categories was identified. For passenger cars with a maximum capacity of 5 seats, the lowest price is Dacia Logan of € 9.400 petrol, Dacia Spring electric at € 19.600, coaches, buses and trolleybuses with a capacity of more than 9 seats price the lowest has the Otokar brand of 77.800 € diesel fuel, 530.000 € Trollino Solaris brand electric version and for trucks and road tractors weighing more than 3.5 tons Renault Trafic diesel fuel with purchase price 34. 334 € and Citroen brand e-Relay at the price of € 68.164.

At EU level, the countries with the largest number of cars, coaches, buses, trolleybuses, trucks, road tractors are Germany, Italy, France, Spain, Poland, the Netherlands, Romania. The total number of cars at EU level is 238.745.374, coaches, buses, trolleybuses 797.522, trucks, road tractors 6.615.462.

As can be seen in Figure 1 purchasing costs for petrol or diesel fueled cars are high, while costs for electric cars are two times higher. The purchase value for fuel vehicles but also for electric vehicles is much higher than the GDP of the European Union for 2019, which shows that the total elimination of fuel vehicles would lead to the blocking of other sectors. The total value of purchases of cars on petrol and diesel fuel at EU level is € 2.244.206.515.600 and the total value of purchases of electric vehicles is € 4.679.409.330.400 based on the authors calculations. The highest purchasing values are recorded in six countries Germany, Italy, France, Spain, Poland, the Netherlands.



	Total	Germany	Italy	France	Spain	Poland	Netherlands
Total Fuel million of euros	2.244.206.51	448.530.183.	371.725.180.	304.712.092.	230.846.384.	228.985.560.	81.572.363.4
Total Electric million of euros	4.679.409.33	935.233.149.	775.086.547.	635.357.128.	481.339.269.	477.459.253.	170.087.055.

Figure 1. Total value of EU vehicle purchases (€ million)

Source:Research data, processed by the authors through the Excel program.

The EU's main new growth strategy aims to meet as well clean energy, sustainable industry, eliminating pollution, preserving biodiversity, reasearch and development, preventing unfair competition from carbon leakage being all these considered as elements of the European Green Deal (EC, 2019).

The paper aims to study in its complexity the EU countries progress toward green economy and to identify success factors toward the European Green Deal objectives.

The present study focuses on the following research questions: what is the role of innovation in the transition process to green economy, the investments in innovation or in eco-innovation is most beneficial in this respect, exists positive significant relationship between financial and economic indicators and the progress toward the achievement of sustainable development goals and regarding a green future, building a low carbon future.

An integrative literature review was conducted to evaluate the theory, provide an overview of the knowledge base in order to answer the research questions.To make the greatest contribution to the paper reliable and publicly available sources were used having relevance to the topic. For the appropriate processing of the selected databases the SPSS software package was used.

Research methodology and Data

The authorss consider that, in order to becoming the first climate-neutral continent by 2050, to reduce in Europe the gap between developed and transition economies, to identify regions and sectors which are most affected by transition of EU economy to a green model, it is necessary to explore the theme of green economy, to make a detailed analysis of sustainability activities and study the financial, and economic factors and their impacts within and across societies. The study is focused on the following research topics.

Question 1: To evaluate the progress toward green economy authors first will determine a comparative view of economic development, innovative and eco-innovatve performance, their

relationship with the transition process in the EU. The research is conducted to study the relationship between transition economies and developed economies as it relates to transition and the implications for socio-economic development and seeing whether there is a meaningful difference or not.

H1: The innovation capacity (EIS) and eco-innovation performance have significant role in the transition process.

H2: The investments in eco-innovation is more beneficial having strong positive impact on the achievment of the Green Deal Goals.

H3: Developed economies are less affected by the transition.

Question 2: Authors will explore the transition process in its multidimensionality using 18 variables which highlight financial and economic characteristics, economic development, innovation, the level of achievement of SDGs. To gauge the green progress various indicators such as the indicators that make up the Environmental Protection Expenditure Account (EPEA) were used.

H4: The countries progress and commitment toward building a low carbon future has positive strong relationship with General government expenditure by function, Gross domestic Product at market prices, GNI per capita in PPS, Final energy consumption in households per capita, Gross value added and income by A*10 industry breakdowns, National expenditure on environmental protection by institutional sector, Production of environmental protection services of general government by economic characteristics, Environmental subsidies and similar transfers from general government, by environmental activity, sector of recipient and ESA category of transfer, Environmental protection investments of corporations as specialist and secondary producers by environmental protection activity, General government expenditure by function, Gross domestic product in current prices, Final energy consumption in households per capita.

H5: The countries progress and commitment toward building a low carbon future has positive strong relationship tax revenue - Air pollution and tax revenue Climate change.

This study is based on a cost-benefit analysis at EU level in which financial, economic, social and environmental indicators will be analyzed. At the same time, an analysis will be made for the automotive sector broken down into categories: cars, coaches, buses, trolleybuses, trucks and road tractors to see the profitability of the government's program to renew the fleet of electric vehicles for both passenger and of goods.

In the analysis of the four economic, financial, social and environmental dimensions, some indicators have been replaced and others have been abandoned due to differences in the statistical methods used, the particularities of each state or the availability of data sources. The selection of indicators was based on the following three principles:

a) Systematization: the selected indicators must cover the transition to the sustainable development of the green economy

b) Targeting: the system of selected indicators must be in a direct link with the 17 sustainable development objectives

c) Availability: the indicators were extracted from publicly available databases. Indicators must be clear, specific, measurable and easy to apply.

Environmental protection includes all activities and actions aimed at preventing, reducing and eliminating pollution and any other form of environmental degradation. These activities and actions also include measures taken to restore the environment after it has been degraded.

In order to see to what extent the EU economy can become sustainable and competitive, the financial indicators have been analyzed in the light of the way in which they are transposed into the national accounts system. In this regard, the indicators that make up the Environmental Protection Expenditure Account (EPEA) have been selected other environmental degradation. EPEA assesses an economy's financial commitment to environmental protection, how environmental costs affect national competitiveness, assesses the application of the „polluter pays" principle and the cost-effectiveness of environmental control mechanisms (Romanian National Institute of Statistics, 2019).

The most important indicators are the National expenditures for environmental protection by institutional sector, The production of environmental protection services of the public administration according to economic characteristics; Environmental grants and similar transfers from general government, by environmental activity, beneficiary sector and ESA transfer category; Environmental protection investments of corporations as specialist and secondary producers through the activity of environmental protection; General public administration expenses.

The selection of these indicators was made because they cover the entire national economy, as defined in the National Accounts according to ESA 2010. The institutional sectors in ESA 2010 are non-financial corporations (sector S11), financial companies (sector S12), general government (sector S13), institutions non-profit in the service of households (sector S15) and the rest of the world (sector S2). The EPEA further groups these sectors for simplification (European System of Accounts, 2010).

Were used publicly available databases such Green Future Index (GFI) 2021 (Green Future Index, 2021), a research program by MIT Technology Review Insights which ranking 76 countries on "their progress and commitment toward building a low carbon future" and it is calculated on five pillars: carbon emmisions, energy transition, green society, clean innovation and climate policy.

European Innovation Scoreboard (EIS) (Es-Sadki & Hollanders, 2021), a composite indicator which gives a comparative assessment of EU member states' innovation performance and ranks countries according to four performance groups. The Sustainable Development Report (SDR) (Sachs, et al., 2021), formerly the SDG Index & Dashboards, includes 115 indicators in 2020. It assesses worldwide the countries' achievements on the Sustainable Development Goals performance. The latest SD report was elaborated considering Covid-19, the pandemic having huge implications on progress towards SDGs.

The eco-innovation scoreboard (Eco-IS) (EC, 2021) published since 2010 by European Commission (EC), measures and compares the eco-innovation performance of EU Member States and facilitates the transition process of member states to the green economy. Applying 16 indicators grouped by five dimensions: eco-innovation input, eco-innovation activities, eco-innovation output, resource efficiency outcomes and socio-economic outcomes "aims to promote a holistic view on economic, environmental and social performance.

OECD.stat (OECD, 2022) financial indicators: tax revenue % GDP/capita, TR - Air pollution 2020, TR - Biodiversity 2020, TR - Climate change 2020, National expenditure on environmental protection by institutional sector 2018, Production of environmental protection services of general government by economic characteristics 2018, Environmental subsidies and similar transfers from general government, by environmental activity, sector of recipient and ESA category of transfer 2019, Environmental protection investments of corporations as specialist and secondary producers by environmental protection activity 2018, General government expenditure by function 2020. Economic indicators: Gross domestic product at market prices 2020, Final energy consumption in households per capita 2020, GNI per capita in PPS 2020, Gross value added and income by A*10 industry breakdowns 2020, Final consumption aggregates by durability.

The different types of used indicators characterizes the financial aspects of green economy, measure the countries performance, identifies the success factors of the progress toward green future and, in this way, they sustain the methodology giving a strong fundamental base for this study. Descriptive statistics was used to thoroughly study the internal and external interpretation of the results. To verify the relationships suggested by the hypotheses, regression analysis was employed. To measure the strength of association between two ranked variables, the Pearson and the Spearman's rank-order correlation was calculated. For data processing, the SPSS software package was used.

Results and Analysis

To analyze the impact of innovative capacity and eco-innovation performance on green transition, hypothesis ***H1*** and ***H2*** was tested. To see the relationship between Green Future Index (GFI) and innovation capacity (EIS) respectively eco-innovation performance (ECO-I) the Spearman correlation coefficient ρ was calculated and the obtained results are presented in Table 1.

Table 1. The calculated Spearman coefficient

ρ	**ECO-I**	**EIS**
GFI	0.713	0.660

Source: (EC, The Eco-Innovation Scoreboard and the Eco-Innovation Index, 2021), (Es-Sadki & Hollanders, 2021), (Green Future Index, 2021).

The calculated Spearman coefficient ρ indicates a strong positive relationship with the eco-innovation performance and moderate positive relationship with innovative capacity of European countries. Thus investments in eco-innovation is more beneficial for the achievment of the Green Deal Goals. The Spearman correlation highlight the monotonic relationship between the considered variables (See Figure 2).

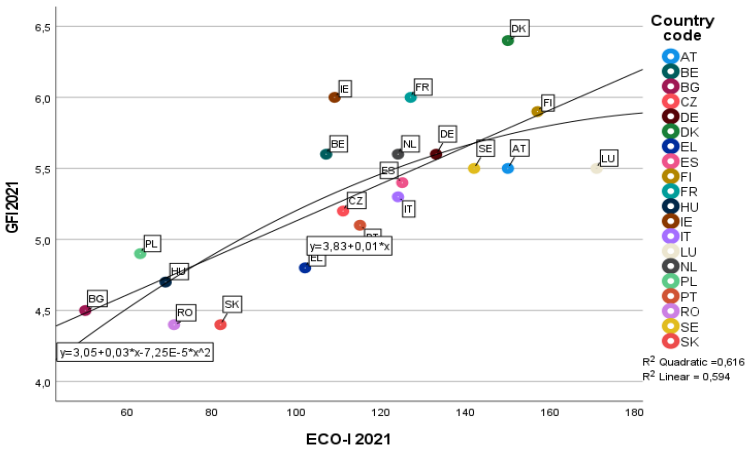


Figure 2. Positive strong relationship between GFI and ECO-I

Source: Research data, processed by the authors through the SPSS statistics program.

To analyze the impact of economic development on green transition, hypothesis ***H3*** was tested. The Spearman coefficient was calculated for the GFI and GNI as a measure of economic growth. The obtained value of ρ=0,739 indicates that developed economies are less affected by the green transition. Low positive relationship was obtained calculating Pearson coefficient, r = 0,462 thus it is not a linear relationship.

To analyze the impact of economic and financial indicators on green transition, hypothesis ***H4 and H5*** was tested. Spearman correlation coefficient was calculated and the calculated values are presented in Table 2.

Table 2. The calculated Spearman correlation coefficient – financial indicators

ρ	General government expenditure by function 2020	GDP at market prices 2020	GNI per capita in PPS 2020	Final energy consumption in households per capita 2020	Gross value added and income by A*10 industry breakdowns 2020	Tax revenue	GFI
TR Air pollution 2020	0,854**	0,966**	0,418	0,210	0,961**	0,988**	0,761**
TR Biodiversity 2020	0,346	0,271	0,216	0,155	0,265	0,397*	0,390
TR Climate change	0,855**	0,918**	0,407*	0,205	0,964**	0,995**	0,764**

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Source: Research data, processed by the authors through the SPSS statistics program.

As can be seen in Table 2, there is a strong correlation between Tax revenue Air pollution (TR-Air pollution) and General government expenditure (0.854**), GDP in current prices (0.966**), Gross value added and revenue by industry breakdowns A * 10 (0.934) and GFI (Green Future Index) 0.761** (see Figure 3). This shows us that tax revenues from air pollution taxes influence the main aggregates of GDP. There is also a strong correlation between Climate Change Tax Revenue (TR Climate Change) and General Government Expenditure (0.846), GDP at Current Prices (0.956), Gross Value Added and Industry Breakdown A * 10 (0.995) and GFI (0.764). This shows us that environmental revenues are an important tool for governments to shape the relative prices of goods and services.

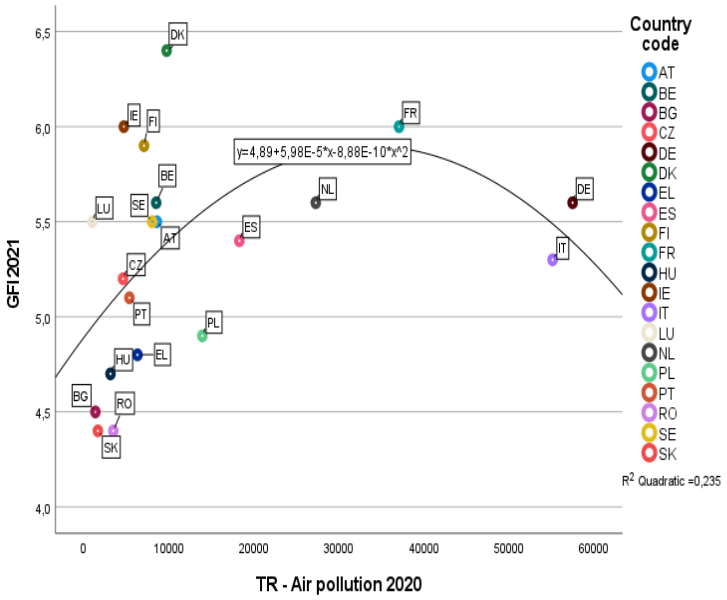


Figure 3. Positive strong relationship between GFI and TR-Air pollution

Source: Research data, processed by the authors through the SPSS statistics program.

In Table 3. the correlation coefficient for the economic indicators has been established.

Table 3. The calculated Spearman correlation coefficient – financial indicators-

ρ	General government expenditure by function 2020	Gross domestic Product at market prices 2020	GNI per capita in PPS 2020	Final energy consumption in households per capita 2020	Gross value added and income by A*10 industry breakdowns 2020	Tax revenue	GFI
ECO-I	0,449*	0,517**	0,769**	0,585**	0,511**	0,500**	0,713**
SDG	0,573**	0,485*	0,549**	0,657**	0,476*	0,532**	0,555**
EIS	0,366	0,391*	0,871**	0,633**	0,391*	0,372	0,660**
GFI	0,653**	0,801**	0,739**	0,519**	0,805**	0,749**	

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Source: Research data, processed by the authors through the SPSS statistics program

The importance of the general government sector in the economy can be assessed through general government revenues and expenditures as a percentage of GDP, resulting in a strong correlation between fiscal revenues and general government expenditures (0.847), between fiscal revenues and GDP in current prices (0.955), between Tax revenues and Final energy consumption in households per capita (0.964). There is a strong correlation between ECO-I and GNI per capita in PPS (0.772) as well as ECO-I and Final Energy Consumption in households per capita (0.617), there is a very good correlation between SDG and Final Consumption of GDP. energy per capita (0.651), between EIS and GNI per capita in PPS (0.791), EIS and Final energy consumption per capita (0.606).

There is a very good correlation between ECO-IS (Eco-Innovation Scoreboard) and Gross National Income per capita (0.769**) which highlights the performance of eco-innovation in EU Member States which captures various aspects of eco-innovation reflected in eco-innovation

inputs, eco-innovation activities, eco-innovation outcomes, resource efficiency and socio-economic outcomes (European Commission, 2016). There is a strong correlation between the European Innovation Scoreboard (EIS) and Gross National Income per capita (0.791), which shows an increase in innovation performance at EU level.

Table 4. The calculated correlation coefficient of the Spearman rank - economic indicators

ρ	National expenditure on environmental protection by institutional sector	Production of environmental protection services of general government by economic characteristics	Environmental protection investments of corporations as specialist and secondary producers by environmental protection activity	General government expenditure by function	Gross domestic product at market prices 2020	Final energy consumption in households per capita
GFI	0,753**	0,730**	0,720**	0,653**	0,801**	0,519**

Source: Research data, processed by the authors through the SPSS statistics program.

In Table 4 the correlation coefficient of the Spearman rank was established between the Green Future Index (GFI) and the economic indicators, which showed that there is a positive strong correlation between GFI and Environmental subsidies and similar transfers from general government, by environmental activity, sector beneficiary and ESA transfer category. This shows that maintaining and increasing subsidies and other forms of government support (such as tax cuts, tax exemptions, tax credits, tax deferrals) helps to protect the environment and build a low-carbon future (Eurostat, 2021).

Conclusion

As it is well known a „green economy is one which policies and innovations enable society to generate more of value each year, while maintaining the natural systems that sustain us" as defined by the European Union. Climate change, environment deterioration and continual loss of biodiversity have the potential to generate an increasingly higher number of disturbances and shocks in the areas that are highly dependent on natural resources (De Urioste et al., 2015). Even after societies understand the importance of Green economy and sustainable development and the need to manage climate change, Green economy plays a key role in maintaining the goods and services eco-sustainable on the market and in acknowledging the need to use non-invasive or environmentally-friendly practices.

In this context, assessing the degree to which the Green economy is seen as an instrument of developing the goods and services eco-sustainable and may offer a comprehensive image on the public policies and private initiatives that might be implemented. Moreover, if there were some theoretical approaches in international scientific literature regarding this theme, the offered practical solutions were insignificant in numbers. Through this paper and its results, interesting correlations were proposed, which will be useful in financial and economic policy making within the European countries. The main conclusion of this paper is that a strong link between tax revenues from air pollution collection taxes and general government expenditure, GDP at current prices, gross value added and tax revenues.

References

Center for Environmental Management and Policy Analysis, 2020. Green economy progress measurement in Jiangsu&Fujian Province, China. [pdf] Retrieved from : <https://www.un-page.org/files/public/2015-2017_green_economy_progress_measurement_in_jiangsu_and_fujian_province_china_200711.pdf >.

Economic Commission for Africa and United Nations Environment Programme, 2012. A Green Economy in the context of sustainable development and poverty eradication: What are the implications for Africa?. [pdf] Retrieved from :< https://www.greengrowthknowledge.org/research/green-economy-context-sustainable-development-and-poverty-eradication-what-are-implications> .

European Commission, 2021. EU invests over €1 billion in innovative projects to decarbonise the economy. [online] Retrieved from :< https://ec.europa.eu/commission/presscorner/detail/en/ip_21_6042 >.

European System of Accounts, 2010. A new European System of National and Regional Accounts. [pdf] Retrieved from :< https://www.oecd.org/sdd/na/ESA%202010.pdf>.

Eurostat, 2021. Environmental subsidies and similar transfers (env_esst). [online] Retrieved from:< Environmental subsidies and similar transfers (env_esst) (europa.eu)>.

Eurostat, 2021. How has the EU progressed towards the SDGs?. [online] Retrieved from:< https://ec.europa.eu/eurostat/web/sdi/key-findings>.

Eurostat, 2021. Lorries and road tractors, by age. [online] Retrieved from:< https://ec.europa.eu/eurostat/databrowser/view/road_eqs_lorroa/default/table?lang=en >.

Eurostat, 2021. Motor coaches, buses and trolley buses, by age. [online] Retrieved from:< https://ec.europa.eu/eurostat/databrowser/view/road_eqs_busage/default/table?lang=en >.

Eurostat, 2021. Passenger cars, by age. [online] Retrieved from:< https://ec.europa.eu/eurostat/databrowser/view/road_eqs_carage/default/table?lang=en>.

Eurostat, 2021. Sustainable Development Goals – Overview. [pdf] Retrieved from:< https://ec.europa.eu/eurostat/web/sdi>.

GPL Autogas Info, 2022. Ethanol Stations in france in March 2022. [online] Retrieved from:< https://www.glpautogas.info/en/ethanol-stations-france.html>.

Institutul Național de Statistică din România, 2019. Broșură Conturi Economice de Mediu. Retrieved from:< https://insse.ro/cms/sites/default/files/field/publicatii/conturi_economice_de_mediu_5.pdf >.

IPPC, 2021. Climate change widespread, rapid, and intensifying. [online] Retrieved from :< https://www.ipcc.ch/2021/08/09/ar6-wg1-20210809-pr/>.

McKinsey Sustainability, 2020. How the European Union could achieve net-zero emissions at net-zero cost. [online] Retrieved from:< https://www.mckinsey.com/business-functions/sustainability/our-insights/how-the-european-union-could-achieve-net-zero-emissions-at-net-zero-cost.

Official Journal of the European Union, 2021. Commission Implementing Regulation (EU) 2021/535 of 31 March 2021 laying down rules for the application of Regulation (EU) 2019/2144 of the European Parliament and of the Council as regards uniform procedures and technical specifications for the type-approval of vehicles, and of systems, components and separate technical units intended for such vehicles, as regards their general construction characteristics and safety, [pdf] Retrieved from :<https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32021R0535&rid=2 >.

Parlamentul European, 2021. Emisiile de gaze cu efect de seră pe țări și pe sectoare (infografic).[pdf] Retrieved from:<https://www.europarl.europa.eu/news/ro/headlines/society/20180301STO98928/emisii-de-gaze-cu-efect-de-sera-pe-tari-si-sectoare-infografic>.

Politico, 2018. Europe's ghost car fleet haunts recycling targets. [online] Retrieved from :< https://www.politico.eu/article/europes-ghost-car-fleet-undermines-eu-recycling-targets-illegal-scrappers-commission-circular-economy/>.

Studio Gear Up, 2021. Low-carbon mobility with renewable fuels – Affordability and accessibility of passenger cars for EU-consumers). [pdf] Retrieved from: https://www.fuelseurope.eu/publication/low-carbon-mobility-with-renewable-fuels-affordability-and-accessibility-of-passenger-cars-for-eu-consumers/ >.

The London School of Economics and Political Science and university of Leeds, 2021. Policy brief. Lessons from COP26 for financing the just transition. [pdf] Retrieved from: https://www.lse.ac.uk/granthaminstitute/publication/lessons-from-cop26-for-financing-the-just-transition/.

The London School of Economics and Political Science and university of Leeds, 2021. Policy brief. Lessons from COP26 for financing the just transition. [pdf] Retrieved from: https://www.lse.ac.uk/granthaminstitute/publication/lessons-from-cop26-for-financing-the-just-transition/.