

Considerations to Eco-Innovation and Its Relationship with Economic Growth

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Abstract

In the present paper we aim to study the relationship between eco-innovation and economic growth at the European Union level, using the eco-innovation index and indices of real GDP per capita growth, and to verify whether progress in eco-innovation is improving the performance of the European economy. Using longitudinal and cross-sectional methods, we have monitored progress in eco-innovation over the last decade for the three country groups: Leaders group, Performers group and Catching group.

In the current context, innovation is an important source of growth and development, both at national and regional level. Eco-innovation is the path to sustainability because it combines environmental impact with positive achievements in the economy and society. We conclude that Eco-innovation optimises economic growth and contributes to achieving sustainable development goals.

Key words: eco-innovation, sustainability, economic growth, eco-innovation index

J.E.L. classification: O30, O44, Q01

1. Introduction

One of the goals the European community has set itself is to have a climate-neutral, circular economy. To this purpose, it has successively established in the Europe 2020 Strategy and then in the Europe 2030 Strategy a series of measures to create the conditions for smart and sustainable growth based on knowledge and learning, where resources are used efficiently and ecologically.

The Europe 2020 strategy adopted by the European Commission in 2010 brings to the foreground the concept of Eco-innovation in the context of the objective to make Europe's economic growth sustainable and to manage efficiently the resources at our disposal with a minimum effect on the environment. Therefore, the European community recognizes the role that Eco-innovation can play in resource efficiency and identifies a set of EU policy instruments to support the circular economy. Eco-innovation covers technological and non-technological changes throughout the life cycle of the product whose manufacture needs to be sustainable.

The approach to the problem is an ambitious one, with the EU proposing a strategy based on a new way of production, sustainable resource use and climate neutrality. Consequently, the Eco-Innovation Action Plan has been developed, covering four principal directions: environmental technologies, organisational innovation to introduce organisational methods to solve environmental problems, product and service innovation with environmental benefits, respectively alternative production and consumption systems with reduced environmental impact, such as eco-friendly agriculture or the use of renewable resources for energy production.

To monitor the progress in sustainability and green innovation, the European Commission calculates the eco-innovation index, a composite indicator based on five dimensions, whose performance is measured with different indicators published by Eurostat, EEA or OECD. These five dimensions are eco-innovation inputs, eco-innovation activities, eco-innovation outputs, resource efficiency and socio-economic outcomes.

At the European level in the period 2013-2022, the eco-innovation index has been steadily increasing, with all 5 dimensions showing positive trends. It is notable that the best performance was represented by the increase in resource efficiency, especially the decrease in GHG emissions per unit of GDP. (Al-Ajlani et al, 2021; Al-Ajlani et al, 2022)

2. Literature review

"Eco-innovation is any innovation that makes progress towards a more green and sustainable economy by reducing environmental pressures, increasing resilience or using natural resources more efficiently" (EC, 2022)

A study released at European level in 2021 showed that eco-innovation helps countries to improve their economic growth potential and indicated that eco-innovation has multiple positive effects such as ensuring compliance with environmental sustainability criteria, more efficient use of resources, better waste recycling. This creates an enabling environment for companies to reap multiple economic benefits. Differences between EU Member States have also been identified, resulting that eco-innovation has increased and diversified only in some UE Member States, while in others it has stagnated or even decreased. (Mačiulytė-Šniukienė, 2021)

In 2019, Andabaka et al, investigated the impact of Eco-innovation on economic growth, quality of institutions and municipal waste recycling and found that higher rates of economic growth and higher trust in institutions at EU level have a positive impact on Eco-innovation. Also, institutional support and innovation incentive mechanisms encourage the expansion of Eco-innovation, underpinned by recycling which is an activity that paves the way to a circular economy. (Andabaka et al, 2019)

A series of research studies provide best practice examples of the impact eco-innovation has on resource efficiency, energy consumption reduction, how it contributes significantly to waste reduction, as well as how eco-innovation contributes to improving business performance. (Bartoszczuk, 2015; Cheng, 2014, Agan, 2013; Cai, 2018; Sukri, 2023)

Other studies highlight the importance of environmental management systems (EMS) in stimulating eco-innovation (Horbach et al, 2013; Wagner, 2008)

Using econometric models and panel data for 30 provinces in China for the period 2000-2019 on the link between economic growth and carbon emissions, it was concluded that there is a non-linear relationship between the two variables and that eco-innovation significantly reduces carbon emissions. In addition, the analysis of this link over time shows that the positive effects of economic growth on carbon emissions are decreasing. So, the path to sustainable economic development is based on the widespread use of green technologies. (Nan et al, 2022)

4. Research methodology

Methodologically, we studied longitudinally and cross-sectionally the progress made by EU Member States in terms of eco-innovation. In addition, we used comparative methods to check if the economic growth in EU countries is sustainable and if the eco-innovation index is changing in the same direction and with the same intensity as the index of change in real GDP per capita.

5. Findings

Since 2010, the European Commission calculates the eco-innovation index for EU countries. It is a composite index based on 16 other indicators covering multiple sectors of eco-innovation in close relation to resource efficiency. These indicators are divided into 5 domains eco-innovation inputs, eco-innovation activities, eco-innovation outputs, resource efficiency outcomes and socio-economic outcomes. The EU average is assigned a score of 100, for countries with above average eco-innovation performance the scores are higher than 100, and for countries with below EU average performance, the index is less than 100.

To make comparisons between Member States and to see if countries with high levels of economic growth also register high level of eco-innovation, we used the relative levels of real GDP per capita compared to the EU average.

Table no. 1 Eco-Innovation Scoreboard for Leaders group

	EU-27	LU	FI	AT	DK	SE	DE	FR	IT	NL
Eco-Innovation Index 2013	100	150.74	168.67	137.27	151.84	152.99	109.83	109.58	102.55	95.1
Eco-Innovation index 2022	121.47	179.02	178.01	173.06	167.19	160.95	141.18	130.65	129.39	118.78
Percentage Change 2022 compare to 2013 for Eco-Innovation Index (%)	21.47	18.76	5.54	26.07	10.11	5.20	28.54	19.23	26.17	24.90
Real volume GDP per capita 2013 (EU=100)	100	329	138	144	177	162	133	124	102	152
Real volume GDP per capita 2022 (EU=100)	100	261	109	125	137	120	117	102	102	129
Percentage Change 2022 compare to 2013 for GDP per capita (%)	0.00	-20.67	-21.01	-13.19	-22.60	-25.93	-12.03	-17.74	0.00	-15.13

Source: https://green-business.ec.europa.eu/eco-innovation_en; https://ec.europa.eu/eurostat/statistics-explained/index.php?title=GDP_per_capita,_consumption_per_capita_and_price_level_indices

For the European countries that are part of the Leaders group, we note that in the period 2013-2022 considerable efforts have been made to turn eco-innovation a priority in their development policies and to maintain this status. We note that the position in the hierarchy in terms of economic growth has been maintained, but the rate of change has decreased across the group. However, even in 2022, as in 2013, the countries record GDP per capita values above the European average, the leaders being Luxembourg, Austria and Denmark.

In terms of eco-innovation, Luxembourg currently tops the ranking, followed by Finland and Austria. Italy and the Netherlands have more modest scores, but it is worth noting the effort made by the Netherlands to move from a score below the European average to a score above the average.

Their position as leading countries and their commitment to sustainable development is also reflected in the average Eco-innovation score, which has changed from 127.85 in 2013 to 149.97 in 2022.

Table no. 2 Eco-Innovation Scoreboard for Performers group

	EU-27	ES	SI	EE	CZ	IE	PT	LV	LT	EL
Eco-Innovation Index 2013	100	104.47	89.74	98.59	92.61	77.28	82.18	80.06	66.24	55.94
Eco-Innovation index 2022	121.47	116.43	115.86	115.52	110.98	110.39	105.69	105.37	103.75	101.59
Percentage Change 2022 compare to 2013 for Eco-Innovation Index (%)	21.47	11.45	29.11	17.17	19.84	42.84	28.61	31.61	56.63	81.61
Real volume GDP per capita 2013 (EU=100)	100	87	50	50	60	148	64	40	43	66
Real volume GDP per capita 2022 (EU=100)	100	85	92	87	91	233	77	74	89	68
Percentage Change 2022 compare to 2013 for GDP per capita (%)	0.00	-2.30	84.00	74.00	51.67	57.43	20.31	85.00	106.98	3.03

Source: https://green-business.ec.europa.eu/eco-innovation_en; https://ec.europa.eu/eurostat/statistics-explained/index.php?title=GDP_per_capita,_consumption_per_capita_and_price_level_indices

For the countries in the Performers group, we have seen considerable efforts in eco-innovation over the last 10 years, with all making progress in this area. The values recorded for the Eco-innovation index are currently above 100, even though some of them recorded values significantly lower than 100 in 2013, such as Ireland, Lithuania and Greece.

In terms of economic growth, with the exception of Ireland, for all other countries the position of real GDP per inhabitant is below average but shows a clear and steady upward trend, reflecting their efforts towards sustainable economic development.

Table no. 3 Eco-Innovation Scoreboard for Catching-up group

	EU-27	BE	CY	SK	HR	RO	HU	MT	PL	BG
Eco-Innovation Index 2013	100	75.91	68.3	68.13	64.16	86.16	52.64	51.58	46.45	25.18
Eco-Innovation Index 2022	121.47	99.78	94.65	94.41	88.81	84.59	81.15	79.76	67.37	57.73
Percentage Change 2022 compare to 2013 for Eco-Innovation Index (%)	21.47	31.45	38.58	38.57	38.42	-1.82	54.16	54.63	45.04	129.27
Real volume GDP per capita 2013 (EU=100)	100	134	82	53	42	27	41	70	40	22
Real volume GDP per capita 2022 (EU=100)	100	120	91	68	73	77	77	102	80	59
Percentage Change 2022 compare to 2013 for GDP per capita (%)	0.00	-10.45	10.98	28.30	73.81	185.19	87.80	45.71	100.00	168.18

Source: https://green-business.ec.europa.eu/eco-innovation_en; https://ec.europa.eu/eurostat/statistics-explained/index.php?title=GDP_per_capita_consumption_per_capita_and_price_level_indices

For the last group, the catching-up group, the results show that the vast majority of these countries have made efforts to catch up in the field of eco-innovation. In this respect, they have made important progress in the last decade in the field of environmental policies and their implementation, but despite these efforts significant gaps remain between them and the leading countries. Further efforts are needed to bring the Eco-innovation index closer to those of the performers and leaders.

Despite the improvement of the Eco-innovation index values most of the countries in the group, the gap in terms of the index has not decreased significantly compared to the European average. Bulgaria, Hungary and Malta recorded significant increases in the Eco-innovation index, while the other countries in the group showed modest increases. Unfortunately, for Romania, the results recorded are negative, being the only country in the group that had a deterioration of this index.

In terms of the relative position of GDP per capita for these countries, only Belgium has regressed, with all the other eight countries making progress. Croatia, Bulgaria, Poland and Romania have made progress. For Romania, progress is more than significant in terms of economic growth, but we recommend that public policies take into account that unsustainable growth cannot be maintained in the long term. The country needs to work towards sustainable development, which focuses on the efficient use of resources and the preservation of environmental quality.

6. Conclusions

In the current economic context, threatened by crises and uncertainties, the transition to the green economy and Eco-innovation on a large scale provides opportunities and potential for business development. Eco-innovation requires new business models that will generate increased investment, increased productivity, expanded markets and increased ability to be competitive. Moreover, increased productivity will also increase the profitability of businesses, and the economies will be less exposed to changes in environmental regulation. As a result, it will be able to maintain their competitive advantage.

For all these reasons, Eco-innovation reinforces sustainability and creates the opportunity to fundamentally revolutionize certain economic sectors. The results of the study can be a source of inspiration for policy makers in the field of innovation and sustainable development.

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