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The Potential for Innovation and Entrepreneurship in EU Countries in the Context of Sustainable Development

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Abstract: For the European Union, innovation and entrepreneurship are strong vectors to overcome global societal challenges from climate change and sustainable energy to food and healthy living. Innovation is a facilitator of entrepreneurship and a way of empowering people to take charge of their lives and economic prosperity. At the same time, entrepreneurship is the answer to innovation, the concepts of innovation and entrepreneurship being undeniably interrelated. This research proposes assessing the potential for innovation and entrepreneurship in EU countries in the context of sustainable development. With the help of hierarchical clustering analysis, EU countries were classified into four relevant clusters on the basis of the variables considered, which allowed the identification of common features and existing differences. The research was conducted using data provided by the Global Innovation Index, Global Entrepreneurship Index, Eurostat database, and Candriam ESG Country Report at the level of the 27 EU countries. The main results revealed high-performing countries in terms of innovation and entrepreneurship potential, providing relevant information for policy-makers, business practitioners, NGOs, and academics on the direction they need to take for good practice models to be adapted and implemented in countries with sub-optimal performance, to provide them with support for improvement of their innovation and entrepreneurship potential.

Keywords: innovation; entrepreneurship; sustainable development; EU countries

1. Introduction

In recent years, an increasing number of researchers, as well as other stakeholders, are becoming more concerned about the constant changes in contemporary human society in terms of promoting entrepreneurship and innovation for sustainable development. The importance of raising awareness of as many individuals as possible, taking into account both the level of unique individuals but also their role as acting in the name of public institutions, private companies, or NGOs, is underlined by the growing impact that climate change has on our day-to-day life. Thus, in response to these challenges, a 2030 Agenda has been defined, which is an action plan that seeks to provide chances of welfare for as many people as possible, but also for the planet.

Since 1987, with the publication of the Brundtland Report, the definition and popularization of the concept of sustainable development has led to a growing recognition of it, such that in recent years it

has become increasingly evident that it is the only way forward to meet the needs of generations present without compromising the chance of future generations to enjoy at least the same level of well-being [1]. The UN 2030 Agenda for Sustainable Development is based on 17 Sustainable Development Objectives (SDGs) containing a total of 169 indicators, which denotes the urgency and special importance of this problem at a global level [2].

On the other hand, we note significant concerns towards changing the role of regional innovation organizations and policies related to society's transition to a sustainable economy. Thus, the concerns of the past, related to the fight against competition, have now turned into concerns for obtaining low costs, creating chains of global value through knowledge and continuous innovation. At the same time, we identify special attention paid to policies that support the development of the regional innovation system by creating regional innovation organizations conceptualized today in "hubs" specialized in global innovation networks of sustainable production [3].

However, there are still situations where we are witnessing a very limited understanding of how innovation systems are needed to evolve and support companies and society in the process of transition to sustainable development, on the one hand, and what is the role of regional innovation policy in creating local innovation conditions for small- and medium-sized domestic enterprises (SMEs), on the other hand.

Not to be neglected is also the answer related to the reasons for public intervention in the innovation process. This is because we identify two conditions that must be met for public intervention to be justified in a market economy: (a) private actors do not achieve the stated objectives—that is, there is a "problem"; (b) public actors must have the capacity to solve or mitigate problems [4].

The need for innovation policy is undeniable, but it must not replace, or double the private actions of entrepreneurs/companies, regardless of their size. We emphasize, therefore, that public action should help to solve problems that private actors cannot solve, and that innovation policy should be a direction, provided that the objectives are properly formulated, correlated with the global goals of sustainable development [5].

At the same time, taking into account the global climate change implications, as well as numerous corporate governance controversies around the world, they have forced stakeholders to focus more attention on environmental, social, and governance (ESGs) aspects. Thus, international organizations and individual investors have begun to pay an increasing amount of attention to the critical role of companies and governments towards contributing to sustainable development [6–8].

Currently, after several decades of research on the importance and influence of corporate social responsibility (CSR) on business and economic performance, there are still many researchers who claim that extensive research is needed before these links can be fully understood by developing and using models, including as many of the current variables as possible [9–11].

In recent years, researchers' concerns also seek to identify models that explain the links between CSR/ESG and the performance of countries and governments that are assessed in the light of the latest economic, political, and social developments [11–14]. As Joseph Schumpeter points out, innovations are essential to explain economic growth, with entrepreneurs playing the role of a central innovator, having as a very important function the allocation of existing and limited resources for "new uses and new combinations" [15]. The fundamental discoveries of technology are the essence of the economic development process and they affect the whole economy. Thus, innovation policies can also be linked to the three pillars of sustainable development, namely economic growth, social equity, and environmental protection [16,17].

Based on the above considerations, in particular the fact that sustainable development is based on innovation and sustainable entrepreneurship, this research aims to assess the potential for innovation and entrepreneurship in EU countries in the context of sustainable development, with the help of cluster analysis, in order to efficiently segment and identify the common features specific to the groups of best-performing and less-performing countries. Based on this research, we aim to highlight the factors that can lead to increased performance in countries in terms of potential for innovation and

entrepreneurship, while isolating those factors that can be an obstacle, and thus paving the way for detailed analysis in each country. Our study contributes to the development of knowledge through the analysis made at the countries' level, and also provides the knowledge and tools needed to shape a better and responsible future, addressing, at the same time, the existing gap in the current research.

This paper is divided into five sections. Following the introduction, Section 2 presents a literature review. Section 3 includes information on the variables and research methodology. Section 4 presents the main findings, and Section 5 aggregates the conclusions of the research.

2. Literature Review

The adoption of the 2030 Agenda has demonstrated the need to change existing priorities, from quantifying economic growth at any cost to recognizing and rewarding sustainable economic development. Of course, economic growth and sustainable development are interdependent, but it is clear that achieving economic performance with an emphasis on sustainability requires a greater share of innovation.

Innovation represents a key factor for entrepreneurship, and at the same time, determines the capacity of an organization to support its competitive advantages, to help the organization better answer to rapid and sudden changes within the market and economy it functions in [18–21]. If, in the past, it has been considered that innovation was exclusively equivalent to high technology development and to making products with new features, at present, innovation is understood as a continuous, systematic activity which targets the entire organization, including its organization forms and methods [22,23].

At the same time, the literature emphasizes that innovation is based on policy tools or measures that target two different types of processes that have been highlighted as important for the transition of society and the economy to sustainability: (1) creating niche innovations, including their development over time and eliminating existing processes and products, and (2) "improving price performance", as price performance is an important process that helps to stabilize a niche of products and services and allows it to compete with existing technologies [24].

Increasing the economic performance of less developed regions continues to raise issues both in terms of policy interventions that promote sustainable regional development, but also in those that focus on networking and developing innovation-based entrepreneurship. There are, moreover, unique means of facilitating regional development through complex programs, which include elements related to entrepreneurship, innovation, and sustainable policies. Trying to support entrepreneurship and innovation in a regional environment that is not traditionally strong in this respect is challenging for any region [25].

Practically, sustainable innovation refers to innovation which brings economic, ecological, and social benefits, contributing to the concept of the triple bottom line [26]. Carrillo-Hermosilla et al. [27] broadened the area of sustainable innovation, considering that it may be defined as "an innovation which sustainably improves performance". In their opinion, such performance includes ecological, economic, and social aspects. Taking into consideration the challenges of sustainable development, sustainable innovation should be systemic and characterized by radicalization [28]. Generally, sustainable innovations are beyond the simple innovations of products and processes, being oriented towards the future. Obviously, sustainable innovation exceeds eco-innovation, since it includes different social objectives and is more related to the holistic process of sustainable development.

Besides the concept of sustainable innovation, a growing number of researchers have introduced a new and somehow different concept: innovation oriented towards sustainability. Hansen and Gosse-Dunker [29] showed that in comparison to durable innovation, sustainability-oriented innovation takes into consideration the risk associated to the social and environmental dimensions. If sustainable innovation is the type of innovation which considers both the social and environmental dimensions, besides the economic one which remains the most important, sustainability-oriented innovation wants to solve the social and environmental problems, while considering the economic aspects as well.

Some researchers consider that future competitiveness will not just be the struggle of the organization to maintain competitive on current markets, but firstly, it refers to the forming of new markets through the innovation process [28,30,31]. If innovation is a risky process, in the case of sustainable innovation, it is considered that we deal with a win-win situation [32].

Sustainable innovation could be considered as a sustainable solution developed to be long-lasting and environmentally responsible for the company, society, and the users [33]. Consequently, interest in sustainable innovation is growing fast. This phenomenon is determined by the high number of social and environmental problems, researchers emphasizing the idea of turning challenges into opportunities and new outlets, and these aspects being intertwined with ESG factors.

At the same time with climatic changes, the concept of eco-innovation has appeared. This new type of innovation refers to those actions related to solving environmental problems [34,35]. Renning and Rammer [36] considered that eco-innovation is more complex than the technological innovation, since besides the introduction of a new degree of novelty, it introduces a new dimension-benefits for the environment. Organizations may invest in eco-innovations oriented towards social responsibility functions, the desire to act ethically, the preservation of natural resources, the energetic efficiency, targeting of the obtaining of competitive advantages due to the increase of efficiency, the reduction of costs, and the accepting of some higher prices on behalf of those customers aware of the organization's responsible policies [37].

However, the social dimensions should not be neglected from the innovation process. Social innovation is the type of innovation which searches for new answers to social problems by identifying and supplying new products and services which improve the standards of living for people and communities, and the identification of new processes and participation means which contribute to the improvement of employees' lives [38].

Along with the emphasis on innovation, entrepreneurs from all over Europe and beyond might hear "ESG" (environmental, social, governance) or "sustainability" and think those terms are simply buzzwords that are not relevant to their start-ups. However, savvy entrepreneurs, innovators, and investors are increasingly considering ESG issues as essential drivers for success in today's markets.

ESG factors describe how a business impacts the world around it. Environmental factors will vary based on the type of start-up, and may include carbon emissions across the supply chain, ingredient/material sourcing, energy efficiency, or waste disposal. Social factors include human rights, labor standards in the supply chain, any exposure to illegal child labor, and more routine issues, such as adherence to workplace health and safety. Governance refers to a set of rules or principles defining a company's culture, structure, responsibilities, policies, and procedures. Even if the aspects regarding the impact of ESG on the profitability of the companies are not yet definitively decided, in general, researchers are of the opinion that the effect is a positive one, especially observed through the action of sustainable investors [39–42].

Nevertheless, there is a general opinion according to which corporate social responsibility (CSR) should be integrated into the general strategy of an organization in order to consistently improve their ESG performance, its image and reputation, obtain some competitive advantages, and for reaching a high level of financial performance, thus generating sustainable benefits for both the company and the society [43–50]. Additionally, some researchers have demonstrated that CSR activities are indissolubly linked to innovation—the more an organization is involved in CSR activities, the higher the chances for it to obtain a plus of innovation which derives from the exploitation of the knowledge of the interested parties and the pressures made by them [38,50–52].

CSR represents a company's efforts to have a positive impact on its employees, the environment, and their stakeholders, using different forms of self-regulation that mostly only large companies report on annually. More recently, the introduction of ESG criteria has helped to quantify and to arrive at a more precise assessment of a company's actions. Since the difference between the two concepts is metrics, investors and stakeholders view sustainability ESG scores as more trustworthy than CSR rhetoric reports.

The importance of ESG criteria for entrepreneurs and investors has been largely accepted in the theory of social responsible investing in that it leads to reduction in the capital's cost and increases in market value [53,54]. The general perception is that any costs that may arise as a result of setting up a socially responsible structure of a company are offset by the costs of capital reduction. Looking at ESG from a marketing perspective, its adoption could provide costs and benefits identical to those of an advertising campaign. ESG factors have also been described as a strategic product that are sold by companies to their clients, that enhances revenues for companies which adopt it more quickly and readily, and less revenues for the other companies that take their time to take it on [55].

In recent years, ESG-oriented strategies have become even more important among individual and institutional investors, bringing to the fore the need for new skills of employees, investors, and stakeholders. It is this group that the author studies. As Hockerts and Wüstenhagen [56] argue, "balancing economic health (profit), social equity (people) and environmental resilience (planet) through entrepreneurial behaviorism is what identifies a sustainable entrepreneur". Although sustainable entrepreneurship integrates environmental and social entrepreneurship, many scholars still prefer the use the sustainable entrepreneurship instead of the second [57].

On the other hand, it should be noted there are scholars that argue that CSR is often confused with sustainable entrepreneurship, and the concept of CSR is related to overall societal expectations for companies to behave ethically [58,59]. In the existing literature, there is also a tendency to relate CSR to large firms and sustainable entrepreneurship to small and medium enterprises [56].

As Greco and de Jong [60] justify, a potential common ground between entrepreneurship and sustainability is the concept of longevity of the new products and services, which implies preserving current resources for future generations (sustainability) and developing unique solutions for the future (entrepreneurship). However, at the same time, both sustainability and entrepreneurship require innovation, which applied to both fields, will generate a new combination of existing resources, thus raising the level of efficiency and better serving future generations [61,62].

Given the interest in the role played by ESG dimensions and the importance of innovation and entrepreneurship for sustainable development, this paper aims to assess the potential for innovation and entrepreneurship in EU countries, and identify how these aspects influence the distribution of EU countries on clusters of performance through cluster analysis. We also seek to highlight possible best practice models, and to create a useful map for all stakeholders interested in these issues, addressing the information gap for those important aspects.

3. Research Methodology

3.1. Sample Selection and Variables

To assess the potential for innovation and entrepreneurship in EU countries in the context of sustainable development, we have aggregated the existing data of the Global Innovation Index [63], Global Entrepreneurship Index [64], Eurostat database [65], and Candriam ESG Country Report [66] for 27 EU countries, at the level of 2019. Selected data were processed using basic descriptive statistics. Subsequently, the hierarchical cluster analysis in SPSS statistics was used to identify clusters, aiming to divide the observations into homogeneous and distinct groups, to better understand the existing relationships.

The Global Innovation Index (GII) collects data from more than 30 sources, which encompasses 126 economies, representing 90.8% of the world's population and 96.3% of global GDP, and aims to capture the multi-dimensional facets of innovation at country level. This index is based on two sub-indexes: input Sub-Index (which includes five key piles which influence national innovative activities: institutions, human and research capital, infrastructure, market complexity, and organizations' complexity) and output Sub-Index (which includes two key piles which influence national innovative activities: knowledge and technology, and the innovative results, respectively).

The Global Entrepreneurship Index (GEI) score represents the performance of the involved countries in terms of the quality of their entrepreneurship ecosystem. GEI proposes five levels of index building as it includes the GEI super-index measuring entrepreneurship at the country level, three sub-indices (attitudes, abilities, and aspirations), 14 pillars, 28 variables, and 49 indicators.

From the Eurostat database, we selected the gross domestic expenditure on R&D (GERD) as one of the most important factors influencing the potential for innovation and entrepreneurship for EU countries, the volume of funding allocated directly influencing innovation performance at national level.

Candriam's ESG Country Report meets the growing demand for an investment approach which takes account of environmental or social "externalities" until recently considered "immaterial". Going beyond Gross Domestic Product (GDP) requires linking human inter-generational well-being to all kinds of capital, considering that a society or country's total capital comprises four types of stock or resources: Human Capital, Natural Capital, and Social Capital, alongside Economic Capital. The analysis is based around a dynamic model, which scores countries in terms of how sustainably they manage their Human, Natural, Social, and Economic Capital. These four domains incorporate a wide range of material ESG issues that are evaluated using a set of key performance indicators or KPIs. The independent data sources that feed into the analysis provide measurable and coherent indicators on which to base the rankings and ratings.

The Human Capital indicators aim to identify countries with the highest economic and creative productivity. Natural Capital assesses how a country is conserving and sustainably employing its natural resources, managing its interaction with global environmental issues. Social Capital indicators evaluate the civil society and state institutions of each nation, including levels of transparency and democracy, or corruption and repression, among other factors. Economic Capital assesses the country's economic fundamentals (e.g., GDP, budget deficit, debt service payments), thus measuring countries' ability to finance and support their sustainability policies in the long run.

The variables were selected from the sources mentioned for each EU member country (Table 1). Of the 27 EU countries, we removed Malta from the analysis because the Global Entrepreneurship Index did not offer data for it. The descriptive statistics for all the variables used in this research are presented in Table 2.

Table 1. Selected variables for the analysis.

Variable	Description
GII	Global Innovation Index (points)
GEI	Global Entrepreneurship Index (points)
GERD	Gross domestic expenditure on R&D (%)
HUM_CAP	Human Capital (points)
NAT_CAP	Natural Capital (points)
SOC_CAP	Social Capital (points)
ECON_CAP	Economic Capital (points)

Source: own construction.

Table 2. Descriptive statistics.

Variable	N	Minimum	Maximum	Mean	Std. Deviation
GII	26	36.76	63.65	48.6815	7.65564
GEI	26	28.00	74.00	52.8462	13.89588
GERD	26	0.50	3.32	1.6642	0.88508
HUM_CAP	26	48.70	72.58	61.2819	5.82565
NAT_CAP	26	52.15	72.77	62.1450	5.46610
SOC_CAP	26	52.59	77.83	68.0650	6.56275
ECON_CAP	26	31.58	67.88	53.9750	9.69743

Source: own construction using SPSS.

3.2. Model and Method

To assess the potential for innovation and entrepreneurship in EU countries, hierarchical cluster analysis was used. The available data were processed using the IBM SPSS Statistics software [67].

Based on these considerations, the matrix $Y = \|y_{ij}\|_{i=\overline{1,n}, j=\overline{1,m}}$ will be defined, with seven variables (m) and 26 countries (n) included in the analysis.

The Squared Euclidean Distance Method was used for constructing the proximity matrix [68]:

$$W = \|w_{ij}\|_{i=\overline{1,n}, j=\overline{1,n}},\ w_{ij} = \sqrt{\sum_{i=1}^{n}\left(z_{ik} - z_{ij}\right)^2},\ j = \overline{1,m},\ k = \overline{1,m}\ j \neq i,\ k \neq i,\ w_{ii} = 0$$

To determine the distance between clusters, the Wards Method [69] was used:

$$\Delta(A,B) = \sum_{i \in A \cup B} \|x_i - m_{A \cup B}\|^2 - \sum_{i \in A} \|x_i - m_A\|^2 - \sum_{i \in B} \|x_i - m_{\mathbf{B}}\|^2 - \frac{n_{A \cap B}}{n_{A \cup B}} \|m_A - m_B\|^2$$

Based on the existing literature [68,70,71], analyzing the cluster formation steps and the dendrogram, we can state that a relevant number of two clusters can be identified. Taking in consideration the purpose of the research and without violating the recognized methodologies for selecting the optimal number of clusters, we propose to select the base four clusters, which may be more relevant for a better observation of the influences of the selected variables (Figure 1).

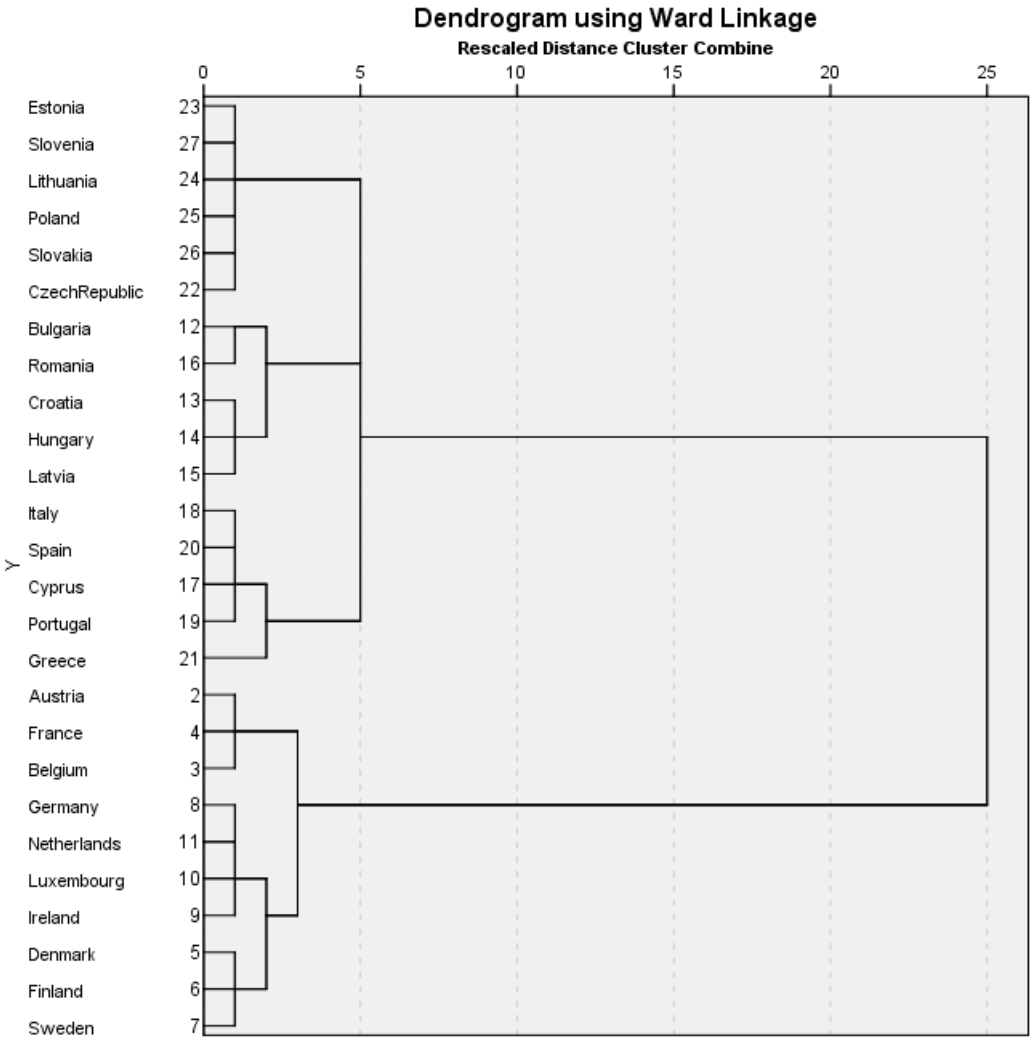

Figure 1. Dendogram of clustering. Source: own construction using SPSS.

The dendrogram is a graphical representation of the clusters analysis' results that records the sequences of merges or splits the steps in a hierarchical clustering solution that shows the clusters being combined and the values of the distance coefficients for each step. Connected vertical lines designate joined cases.

To check the validity of the clusters, we decided to use the Welch Test and the Brown–Forsythe Test (Null Hypothesis H1–H2: variable means do not differ significantly). The results of the tests for a significance threshold of $\alpha = 0.05$ are presented in Table 3.

Table 3. Robust tests of equality of means.

		Statistic [a]	df1	df2	Sig.
GII	Welch	20.154	3	10.729	0.000
	Brown–Forsythe	24.521	3	20.189	0.000
GEI	Welch	54.476	3	10.354	0.000
	Brown–Forsythe	61.295	3	18.701	0.000
GERD	Welch	8.728	3	11.460	0.003
	Brown–Forsythe	14.899	3	21.206	0.000
HUM_CAP	Welch	15.358	3	10.489	0.000
	Brown–Forsythe	17.412	3	12.860	0.000
NAT_CAP	Welch	2.399	3	9.856	0.030
	Brown–Forsythe	2.245	3	16.057	0.022
SOC_CAP	Welch	14.473	3	9.837	0.001
	Brown–Forsythe	17.942	3	14.298	0.000
ECON_CAP	Welch	13.400	3	9.521	0.001
	Brown–Forsythe	9.819	3	17.371	0.001

[a] Asymptotically F distributed. Source: own construction using SPSS.

Subsequently, these results were tested by ANOVA. The results are presented in Table 4.

Table 4. The analysis of variance (ANOVA).

		Sum of Squares	df	Mean Square	F	Sig.
GII	Between Groups	1105.241	3	368.414	22.516	0.000
	Within Groups	359.978	22	16.363		
	Total	1465.219	25			
GEI	Between Groups	4305.251	3	1435.084	60.467	0.000
	Within Groups	522.133	22	23.733		
	Total	4827.385	25			
GERD	Between Groups	11.705	3	3.902	10.894	0.000
	Within Groups	7.879	22	0.358		
	Total	19.584	25			
HUM_CAP	Between Groups	593.033	3	197.678	17.026	0.000
	Within Groups	255.423	22	11.610		
	Total	848.456	25			
NAT_CAP	Between Groups	185.165	3	61.722	2.417	0.024
	Within Groups	561.791	22	25.536		
	Total	746.956	25			
SOC_CAP	Between Groups	782.394	3	260.798	19.492	0.000
	Within Groups	294.349	22	13.380		
	Total	1076.743	25			
ECON_CAP	Between Groups	1199.992	3	399.997	7.645	0.001
	Within Groups	1151.013	22	52.319		
	Total	2351.005	25			

Source: own construction using SPSS.

4. Empirical Results and Discussion

Following the described method, four significantly different clusters were determined in terms of potential for innovation and entrepreneurship in EU countries in the context of sustainable development (Tables 5–8).

Table 5. Cluster 1—Central and Baltic Countries.

No.	Country	GII	GEI	GERD	HUM_CAP	NAT_CAP	SOC_CAP	ECON_CAP
1.	Czech Republic	49.43	43.00	1.93	65.21	57.31	71.28	61.12
2.	Estonia	49.97	55.00	1.40	61.98	64.12	70.53	60.01
3.	Lithuania	41.46	51.00	0.94	61.30	68.06	70.96	56.75
4.	Poland	41.31	50.00	1.21	60.65	52.87	64.80	55.85
5.	Slovakia	42.05	45.00	0.84	58.33	60.28	66.95	55.70
6.	Slovenia	45.25	54.00	1.95	62.52	61.56	68.75	57.39
	Mean values	44.9117	49.67	1.3783	61.6650	60.7000	68.8783	57.8033

Source: own construction using SPSS.

The countries included in Cluster 1—Central and Baltic Countries—are part of the group of Central European States and Baltic States: Czech Republic, Estonia, Lithuania, Poland, Slovakia, and Slovenia.

The countries that are part of this cluster are characterized by average values for the Global Innovation Index and Global Entrepreneurship Index. Simultaneously, the average gross domestic expenditure on R&D is just above average compared to the countries in the other clusters, with a maximum of 1.93% for the Czech Republic, but considerably lower values for Slovakia (0.84%) and Lithuania (0.94%). Regarding the values for Human Capital and Social Capital, they are very close to the average of the four clusters, while the scores for Natural Capital are below average and the scores for Economic Capital register values above the average of the four clusters.

If we were to characterize in an extremely concise way, the countries gathered in this cluster have the closest values to the average for the European Union for selected variables.

Table 6. Cluster 2—Eastern Countries.

No.	Country	GII	GEI	GERD	HUM_CAP	NAT_CAP	SOC_CAP	ECON_CAP
1.	Bulgaria	40.35	28.00	0.76	52.26	52.15	56.83	65.42
2.	Croatia	37.82	34.00	0.97	59.35	62.67	60.11	46.69
3.	Hungary	44.51	36.00	1.53	58.28	58.43	52.59	55.92
4.	Latvia	43.23	40.00	0.64	57.99	68.84	64.24	58.13
5.	Romania	36.76	38.00	0.50	48.70	58.67	59.96	59.92
	Mean values	40.5340	35.20	0.8800	55.3160	60.1520	58.7460	57.2160

Source: own construction using SPSS.

In Cluster 2—Eastern countries—were grouped the countries located mainly in the eastern part of Europe, being: Bulgaria, Croatia, Hungary, Latvia, and Romania. The main characteristic of the countries in this cluster is the registration of the lowest average values for the analyzed variables, as well as the most minimum values for these variables.

The Global Innovation Index is at the lowest average value between clusters, with a score of 40.5340 points, representing only 83% of the EU average value; and for Romania, there is also the lowest value of this variable among all countries analyzed. The same situation is repeated for the Global Entrepreneurship Index, which registers an average value of 35.20 points, and which represents only 67% of the EU average; this time, Bulgaria is the country that registers the absolute minimum of this variable, being 28 points, which places it at a little more than a third compared to the best-performing countries (Denmark and Ireland). Gross domestic expenditure on R&D records some of the lowest values among EU countries, with a minimum of 0.5% in the case of Romania.

The average scores recorded for Human Capital and Social Capital are the lowest of the four identified clusters, with an absolute minimum value for Human Capital registered in Romania (48.70 points) and with an absolute minimum value for Social Capital registered in Hungary (52.59 points). The values for Natural Capital are about 97% of the EU average value, but Bulgaria has the lowest absolute value for this variable (52.15 points). Unusually, the countries grouped in this cluster record the highest average value for Economic Capital among the four clusters, which proves the existence of real economic potential existing in these countries.

Table 7. Cluster 3—Southern Countries.

No.	Country	GII	GEI	GERD	HUM_CAP	NAT_CAP	SOC_CAP	ECON_CAP
1.	Cyprus	48.34	48.00	0.55	55.91	54.40	66.83	42.99
2.	Italy	46.30	41.00	1.39	56.21	60.38	63.53	41.20
3.	Portugal	45.70	49.00	1.36	57.59	64.21	69.83	38.41
4.	Spain	47.85	45.00	1.24	58.66	63.01	67.97	46.15
5.	Greece	38.90	37.00	1.18	52.40	54.15	58.49	31.58
	Mean values	45.4180	44.00	1.1440	56.1540	59.2300	65.3300	40.0660

Source: own construction using SPSS.

In Cluster 3—Southern Countries—a total of five countries, which are part of Southern Europe, were grouped as follows: Cyprus, Italy, Portugal, Spain, and Greece. This cluster is defined by the second lowest values for the selected variables.

The average value of the Global Innovation Index stands at about 93% of the EU average value (45.4180 points, compared to 48.685 points), and the average value of the Global Entrepreneurship Index stands at 83% of the EU average value (44 points, compared to 52.8462 points). Gross domestic expenditure on R&D has an average value of 1.1440%, which is about two thirds of the EU average.

Regarding the scores for Human Capital, Natural Capital, and Social Capital, they are a few percentage points below the EU average, except for the Economic Capital, which has the lowest average value among the four clusters analyzed (40.0660 points); and among the five countries which are grouped here, four (Greece, Portugal, Cyprus, Italy) have the lowest four values for this variable, with a minimum of 31.58 points for Greece (which is less than half of the maximum value recorded by Ireland).

Table 8. Cluster 4—Western and Nordic Countries.

No.	Country	GII	GEI	GERD	HUM_CAP	NAT_CAP	SOC_CAP	ECON_CAP
1.	Austria	50.94	66.00	3.17	69.09	67.64	72.56	49.95
2.	Belgium	50.18	64.00	2.76	63.42	59.92	72.92	44.15
3.	France	54.25	69.00	2.20	64.75	67.91	65.92	43.93
4.	Denmark	58.44	74.00	3.03	68.32	66.68	77.12	53.47
5.	Finland	59.83	68.00	2.75	68.85	69.44	75.88	51.42
6.	Sweden	63.65	73.00	3.32	72.58	72.77	77.83	67.44
7.	Germany	58.19	66.00	3.13	67.97	63.08	71.42	61.77
8.	Ireland	56.10	74.00	1.15	59.98	65.92	72.64	67.88
9.	Luxembourg	53.47	58.00	1.21	63.24	63.59	73.97	66.92
10.	Netherlands	61.44	68.00	2.16	67.79	57.71	75.78	63.19
	Mean values	56.6490	68.00	2.4880	66.5990	65.4660	73.6040	57.0120

Source: own construction using SPSS.

Countries belonging to Cluster 4—Western and Nordic Countries—were grouped based on the highest than average values for all the selected variables. This cluster includes 10 countries, being Austria, Belgium, France, Denmark, Finland, Sweden, Germany, Ireland, Luxembourg, and the Netherlands.

The 10 EU countries grouped in this way register the highest average value for the Global Innovation Index (56.690 points), being more than 16% higher than the EU average; and Sweden registers the highest absolute value among the EU countries (63.65 points). In the case of the Global Entrepreneurship Index, the countries grouped in this cluster also register an average value that is 29% higher than the EU average (52.8462 points), with Denmark and Ireland registering the highest absolute scores among the EU countries (both with 74 points). Regarding the gross domestic expenditure on R&D, the gap between the countries belonging to Cluster 4 and the rest of the analyzed countries is even more significant, with the average value of this indicator being 50% above the EU average, with an average allocation of 2488%, and Sweden having the highest percentage of GDP allocated to R&D (3.32%).

The same high average values are recorded for Human Capital, Natural Capital, Social Capital, and Economic Capital, all variables having values above the EU average and absolute maximum values between EU countries for Human Capital, Natural Capital, and Social Capital recorded by Sweden (72.58 points, 72.77 points, and 77.83 points, respectively). Regarding the absolute maximum value at the European level of Economic Capital, it is registered by Ireland (67.88 points).

In order to obtain a clearer picture of the average values recorded by each cluster for the analyzed variables, as well as the average values recorded at EU level, these were centralized in Table 9. A graphical representation of the identified clusters can also be seen in Figure 2.

Table 9. Mean values for innovation and entrepreneurship EU clusters.

No.	Country	GII	GEI	GERD	HUM_CAP	NAT_CAP	SOC_CAP	ECON_CAP
1.	Cluster 1	44.9117	49.67	1.3783	61.6650	60.7000	68.8783	57.8033
2.	Cluster 2	40.5340	35.20	0.8800	55.3160	60.1520	58.7460	57.2160
3.	Cluster 3	45.4180	44.00	1.1440	56.1540	59.2300	65.3300	40.0660
4.	Cluster 4	56.6490	68.00	2.4880	66.5990	65.4660	73.6040	57.0120
	Mean values	48.6815	52.8462	1.6642	61.2819	62.1450	68.0650	53.9750

Source: own construction using SPSS.

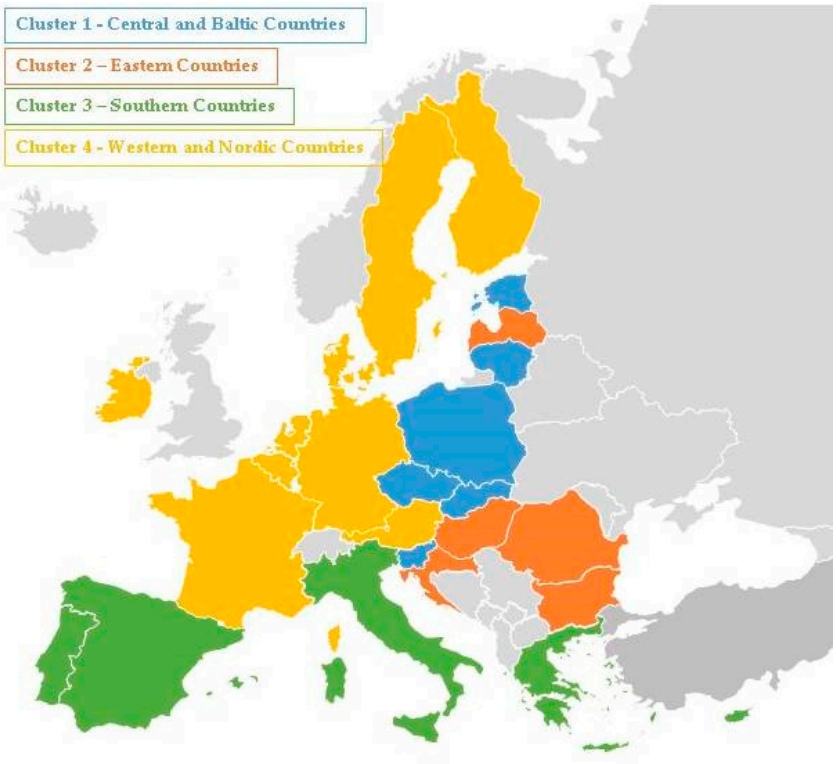

Figure 2. Clusters based on potential for innovation and entrepreneurship in European Union (EU) countries. Source: own construction.

A first significant observation resulting from the research carried out in terms of innovation potential is the clear separation of countries according to the geographical area of the European Union where they are located. Thus, almost naturally, the four identified clusters group countries from Central Europe together with the Baltic States (Cluster 1), Eastern Europe (Cluster 2), Southern Europe (Cluster 3), and the countries of Western and Northern Europe (Cluster 4).

Each of these four clusters groups countries with similar characteristics in terms of variables analyzed—so for Central European countries, we can notice the existence of a high potential for innovation and entrepreneurship, but which is easily pulled back by gross domestic expenditure on R&D and not very high scores in terms of regarding Human Capital, Natural Capital, Social Capital, and Economic Capital. In Eastern European countries, the very low value of gross domestic expenditure on R&D is an archetype, which visibly discourages the latent potential for innovation and entrepreneurship, an observation emphasized by the high scores registered for Economic Capital. For Southern European countries, levels of innovation and entrepreneurship are similar to the Baltic and Central European countries, with the difference that in the south, the scores for Economic Capital are among the lowest in the EU.

Regarding the developed countries in Western and Northern Europe, they are characterized by high values for all variables analyzed, but the high percentages for gross domestic expenditure on R&D are particularly highlighted, which visibly and positively influence innovation and entrepreneurial performance. Another important feature specific to these countries is the very high scores for Social Capital, which underline the very special place given to the civil society and state institutions of each nation, including levels of transparency and democracy, and its importance for sustainable development.

Regarding the relationship between innovation and entrepreneurial capacities, on the one hand, and economic performance and sustainability on the other, a clear distinction can be observed between the four clusters formed. Thus, from the GII point of view, there is a difference of almost 50% between the weakest performing countries (Cluster 2—an average of 43.5340 points) and the strongest performing countries (Cluster 4—an average of 56.649 points). Not surprisingly, the performance in innovation is directly correlated, in the case of the two clusters analyzed, with gross domestic expenditure on R&D. The GERD level for the cluster of the most innovative countries (Cluster 4, with an average of 2488%) is almost three times higher than the average of the least performing countries in the field (Cluster 2, with an average of 0.88%).

Another interesting remark is the one regarding the correlation between the performance in innovation and the score regarding Human Capital, in the sense that a direct and strong connection can be observed between the GII values and the Human Capital score. Not coincidentally, the countries that have clear policies regarding investments and support for human capital development (Cluster 4—Western and Nordic countries) are also the best-performing countries in terms of capacity and performance in innovation at EU level.

Following the analysis of the results obtained from the research, we can also see a strong correlation between entrepreneurial performance (quantified through GEI) and the Social Capital score. Eastern European countries (grouped in Cluster 2), which are characterized by low values of the entrepreneurial index (with an average of 35.20 points), also record the lowest scores of Social Capital (with an average of 58.7460 points). On the other hand, the countries of Western and Northern Europe (Cluster 4) register the highest values for the GEI index (with an average of 68.00 points) but also for Social Capital (with an average of 73.6040 points).

A final important remark, resulting from the analysis, is the one regarding the relationship between the value of Global Innovation Index and the evolution of ESG factors (through the scores related to human, natural, social, and economic capital). Thus, it can be seen that the pillars of sustainability increase in parallel, in a symmetrical way, with the increase of innovation, which demonstrates once again the special importance of the continuous and sustained development of innovation capacity at EU level, both at regional and national level, in order to meet future economic, social, and political challenges.

It is obvious that the most innovative and proactive corporations are the ones most capable of incorporating their sustainable development activities into their strategies of growth. Just like in innovation, a proactive approach is beneficial to the creation of a socially responsible program which may bring value to the organization [72]. Proactive organizations do not wait for pressure from the interested parties to prove their social responsibility—they are continuously looking for more responsible solutions through innovation. Thus, it can be noted that in the case of the countries from Cluster 4 (Western and Nordic countries), a synergic relationship exists between ESG factors and innovation and entrepreneurial performance (quantified by Global Innovation Index and Global Entrepreneurship Index), demonstrating a high potential for economic and sustainable development, findings which are in line with similar research [9,73–79].

5. Conclusions

Through our research, we aimed to identify and evaluate the potential for innovation and entrepreneurship in EU countries in the context of sustainable development, through the scores for each country for Global Innovation Index, Global Entrepreneurship Index, ESG factors (Human, Natural, Social and Economic Capital), and gross domestic expenditure on R&D.

As a result, the four clusters identified the countries according to the selected variables and synthetically reflects the potential for innovation and entrepreneurship for each country and compared to the others.

As the research results demonstrate, at EU level, the best-performing countries in terms of innovation potential and entrepreneurial capacity prove to be the countries in Western and Northern Europe, which not only have the highest scores for Global Innovation Index and Global Entrepreneurship Index, but also present a series of favorable correlations regarding the levels of the other analyzed indicators. Thus, it can be stated that one of the most important and urgent measures that can be adopted is the one regarding the increase of gross domestic expenditure on R&D, having the potential long-term effect of increasing the degree of innovation. Sustained investments in human capital development also prove to be a catalyst for the growth of innovation potential.

Even if the concepts of innovation and entrepreneurship are undeniably interrelated, the present research shows that the development of entrepreneurial potential in EU countries can be sustained and accelerated by paying special attention to the social capital components of the Member States. Only by protecting the rule of law, supporting civil society, and limiting oppressive measures, as well as promoting political freedom and the independence of state institutions, can a satisfactory level of transparency, respect for human rights, and increased efforts to mitigate corruption be achieved. All these measures prove to act as a catalyst for entrepreneurial performance in EU countries, given the correlations identified between the Social Capital scores and GEI values for selected countries.

The promotion of government programs that support innovation and entrepreneurship at the level of each country and also at regional level represents potential solutions that can provide entrepreneurs with more efficient access to financial resources, and on the other hand, they contribute to the support of service innovation through a network developed by the type of regional innovation centers. Supporting innovation in the CRS context at the entrepreneurial level is a solution that can be expanded at regional level through cooperative projects, through the creation of innovation and performance consortia. Practically, the benefits generated by the development of these projects are unquestionable. Improving product quality, access to new markets, developing existing markets, reducing production costs, improving working conditions, and increasing the quality of life are obvious results.

Another aspect highlighted in our research concerns the influence of human capital on the potential for sustainable development. This is justified by the fact that innovative human capital is difficult to measure, but it is not an impediment for organizations to manage and harness employees' skills, values, and attitudes at work. Practically, the ability of organizations (or nations) to manage knowledge resources is one that creates added value and can generate lasting competitive advantages.

From a strategic perspective, innovation and human capital development target employee knowledge as a key factor in developing innovation and marketing it. Thus, it is possible to determine the competitive position of the countries, especially at the level of major investments in technology, the only generator of wealth. Therefore, one of the contributions of our study is that of its relevance to decision-makers as an answer to the existing challenges.

As a general conclusion of this research, one can observe that in terms of assessing the potential for innovation and entrepreneurship in EU countries in the context of sustainable development, a clear segmentation and clustering of countries can be made according to the variables analyzed. This study has important implications for policy makers, business practitioners, and academics. For stakeholders at the level of governments and public institutions, the results of this research can indicate the direction in which public policies should be directed to achieve tangible results in adopting effective sustainable development models. For the business sector and NGOs, this study suggests the directions in which it should direct its attention to identify and take on good practice models to adapt to be implemented in countries with lower performance in terms of sustainable development, to provide development support to meet the highest standards. For academics, this study proposes a new perspective to analyze the potential and performance in terms of innovation and entrepreneurship at EU level and within each of the Member States, and provide a useful tool for tracking future developments, as well as the impact and effectiveness of adopted policies and strategies in the field of innovation and entrepreneurship at the national and regional levels, whose effects are reflected in ESG scores.

A major implication of the analysis of the results obtained from the research is that the development is systemic and parallel along the pillars of sustainability. Given the differences identified at the EU Member States level, we also support the idea that more attention should be paid to current policies, which, as our research has shown, are not sufficient to achieve ambitious long-term goals for developing a sustainable, innovative society.

As the research results suggest, we propose a conceptual reorientation of European policies, especially towards control policies, that highlight significant non-compliant changes, reduce polluting technologies, make changes to non-functional networks, and identify timely solutions for improving innovative systems, at the entrepreneurial and social level.

Of course, the approach presented in the paper is a first step in identifying and defining an overall picture of the EU from the perspective of innovation and sustainable entrepreneurship. A more detailed analysis by developing tools to measure the impact of specific policies and strategies should be carried out to complete the image of our research. It is also important to emphasize that a proactive attitude towards innovation processes and sectoral policies is equally important from the perspective of the transition to a sustainable economy.

The results of this empirical study should also be analyzed, taking into account the potential limitations they imply, but which may open new directions for further research. A potential constraint of this research is represented by the availability and accuracy of the various scores and indexes, together with the models used to obtain these scores.

The findings of this research could generate future research directions for sustainable development models, expanding the set of variables used and trying to identify a generalized model to be able to follow the effectiveness of public policies and strategies adopted at the level of the analyzed countries and to quantify the medium- and long-term effects. Another potential research direction could be to focus on the relationship between innovation and entrepreneurship and its links with economic performance, or their direct and indirect impact on ESG performance.

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