

Article

Contribution of European University Alliances to Education for Sustainable Development and to the SDGs: A Case Study on the Circular EELISA Community

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Abstract: European University Alliances are increasingly crucial to promoting Education for Sustainable Development (ESD) and the Sustainable Development Goals (SDGs) through research, education, and innovation. In this line, the Circular EELISA Community was created as part of the European Alliance of EELISA Universities. This study aims to analyse the contribution of the Circular EELISA Community to ESD and the SDGs, evaluating its contribution according to the impact level of EELISA credentials and the community contribution by year. To conduct this analysis, EELISA credentials, which were awarded to 533 participants in 19 activities between 2022 and 2023, were used as indicators of contribution. The results reveal significant community impact on SDGs 9, 11, and 12, with impact level 2 (knowledge) and increased input in 2023. The Circular EELISA Community positively contributes to ESD and the SDGs. Although the SDGs must be addressed from a systemic perspective, developing tools allows us to deepen our knowledge of concepts such as sustainable development, which can sometimes be ambiguous. This study could facilitate, for students, education professionals, politicians, and all interested parties, identifying appropriate competencies and pedagogies that empower citizens to meet global environmental priorities from socioeconomic and technological perspectives.

Keywords: University Alliances; EELISA communities; Education for Sustainable Development; higher education; SDGs



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1. Introduction

Usually, sustainability tries to address the growing range of environmental issues while balancing socioeconomic goals. The three pillars of sustainability—economy, environment, and society—are not necessarily aligned, often generating situations of complex management and resolution due to different interests, creating situations of instability and tension [1]. Based on the literature, sustainability is addressed from five different perspectives, where the first is the so-called conventional perspective of the economist, in which the economist considers that sustainability is a final state achievable through efficiency in consumption and is an element of a desirable future [2]. According to this perspective, economists do not have the capabilities to predict the impact of the economy on the environment [3]; they have a short-range vision that seeks to express, in economic and compensatory terms, the value of nature and social phenomena [3]. The perspective of non-environmental degradation, with Constance [4] and Daly [5] as key authors, arises from the thought that resources are not eternal and that they must be managed in such a way that the carrying capacity is not exceeded [4–7]. However, this view is given by individuals or groups belonging to developed countries with difficulties or inability to analyse the systems of non-Western societies. Therefore, they do not reflect on the importance of considering, at the same time, the interrelation of social aspects with the environment and

with other aspects, such as infant mortality, illiteracy, poverty, unemployment, or epidemics. In this context, where the priority is to cover basic human needs, the sustainability of the environment becomes less important in the short term [8]. The integrational perspective is more complete than the previous two, including the integration of the three pillars of sustainability, economic, social, and environmental aspects, as well as their interrelations, although generally not in balance [9,10]. However, it focuses on the present, leaving aside the possible temporal repercussions [11]. The intergenerational perspective is based on the Brundtland Report [12] and considers temporal repercussions, especially the long-term effects of decisions currently being taken. Despite being accepted by authors such as Goldin and Winters [2], Langer and Schön [9], and Stavins [13], it is criticized for being too abstract and impractical. Finally, the holistic perspective integrates intergenerational and integrational perspectives into a single focus [11]; it combines temporal considerations with those of the environment (economy, society, and environment), adding the concepts of dynamism and evolution to the definition of sustainability.

This multitude of definitions is what has caused the concept of sustainability to be criticized as ambiguous, unattainable, and confusing [14]. Its complexity often limits policymakers from including it as a main line of action in their plans, further reducing the attractiveness for potential stakeholders, such as educators, trainers, and students [15,16]. Considering interactions at all scales of the multiple dimensions of sustainability is a task that Education for Sustainable Development (ESD)—a concept discussed below—has avoided in the past [17].

1.1. The 2030 Agenda and Education for Sustainable Development

The 2030 Agenda is a global strategic focus plan adopted by each of the member states of the United Nations in 2015. It was designed with the main objective of achieving sustainable development around the world by 2030. The 2030 Agenda is founded on three essential principles: economic progress, social well-being, and environmental protection [18].

The Sustainable Development Goals (SDGs) are at the heart of the 2030 Agenda, which fosters a partnership among all countries to achieve peace and prosperity for people and the planet. The SDGs are a set of 17 goals with 169 targets, intricately connected, as they recognize the interconnectedness of global issues; they are intended to address the urgent challenges facing humanity [19,20]. Table 1 shows the list of the 17 SDGs.

Table 1. The 17 Sustainable Development Goals (SDGs).

SDGs	
1	End poverty in all its forms everywhere.
2	End hunger, achieve food security and improved nutrition, and promote sustainable agriculture.
3	Ensure healthy lives and promote well-being for all at all ages.
4	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.
5	Achieve gender equality and empower all women and girls.
6	Ensure availability and sustainable management of water and sanitation for all.
7	Ensure access to affordable, reliable, sustainable, and modern energy for all.
8	Promote sustained, inclusive, and sustainable economic growth; full and productive employment; and decent work for all.
9	Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation.
10	Reduce inequality within and among countries.
11	Make cities and human settlements inclusive, safe, resilient, and sustainable.
12	Ensure sustainable consumption and production patterns.
13	Take urgent action to combat climate change and its impacts.
14	Conserve and sustainably use the oceans, seas, and marine resources for sustainable development.
15	Protect, restore, and promote sustainable use of terrestrial ecosystems; sustainably manage forests; combat desertification; halt and reverse land degradation; and halt biodiversity loss.
16	Promote peaceful and inclusive societies for sustainable development; provide access to justice for all; and build effective, accountable, and inclusive institutions at all levels.
17	Strengthen the means of implementation and revitalize the global partnership for sustainable development.

It is essential that each country adapts the 2030 Agenda to its national context and develops action plans consistent with its policies and capacities to achieve the objectives and targets set and that countries act under collaboration and cooperation to achieve this ambitious agenda [21].

The SDGs provide a holistic vision to understand sustainability as inclusive and accessible to all, capable of attracting the attention of the citizens and raising awareness in the public [15]. They perceive sustainability from a systemic perspective as a dynamic state that society continuously seeks to achieve [17,22]. The systemic approach of the SDGs is an effective way to resolve conflicts by analysing and considering each of the parties involved and all their possible interactions [17].

In pursuit of this cooperation among countries to achieve sustainable development, the European Union (EU) is focusing much of its efforts on education as one of its main strategic lines [23,24]. This is supported by Target 4.7 of the SDGs, which states the following: “By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and culture’s contribution to sustainable development” [25]. Target 4.7 is closely related to ESD [17,24,26].

ESD is a concept that incorporates into education the vision of educating and empowering citizens regardless of their origin, age, and gender through skills, knowledge, and attitudes so that they take responsibility for leading the change towards a sustainable future [17,26–28]. It incorporates the necessary pedagogical and educational foundations, values, and methodologies that lead to sustainable development at all levels of education [17,24,26,27]. Since both sustainability and education are two dynamic concepts, the definition of ESD is expected to be variable over time [29]. That is why consensus on its definition should not be sought, but its key principles around its purpose, scope, and practice should be agreed upon [30]. Experts agree on the holistic and ecological nature of ESD, which, through a systemic approach, focuses more on the process than on the outcome and is thus a key tool for achieving the SDGs [31].

To this end, countries and communities must adopt education policies and programs that focus on integrating ESD into their academic curricula [32–35]. Once this approach to education is implemented, people could be empowered to become informed and committed agents of change in building a sustainable future [36,37].

1.2. Education for Sustainable Development in University Higher Education

Following the United Nations Conference on the Human Environment of 1972, the environment began to be considered an issue of great relevance [38]; since then, universities, as higher education institutions (HEIs), decided to adopt measures that contribute to sustainable development [39]. Basic education has progressed towards ESD even further since the publication of the SDGs, striving for sustainability at any level and expanding the field of education in an accessible way to give citizens greater possibilities to obtain quality education [40]. In this way, universities have the responsibility to prepare the next generation of professionals, equipping them with the competencies to independently address the global and local challenges they face [34,41]. They have the power to incorporate content related to sustainable development into their curricula through an interdisciplinary approach that cuts across different areas of knowledge [32,33]. Universities can also foster research and innovation, contributing to the search for answers to the challenges posed by the SDG targets [27,35].

1.3. University Alliances

In recent years, the European Commission (EC) [42] has shown an increasing interest in bringing higher education, innovation, and research closer together through partnerships among European countries, highlighting their importance in the future development of the

European Union (EU). One of the most relevant initiatives in this field promoted since 2019 by the EC is the call for the creation of partnerships among higher education institutions in the framework of the European Universities Initiative, which aims for this sector to be in a unique position among society, research, and innovation and play a crucial role in the implementation of the EU political agenda [43,44].

In addition, these partnerships and the joint work among universities, institutions, and organizations promote collaboration and the realization of international projects [44]. These alliances allow for effective cooperation among different higher education institutions, enabling the exchange of resources and knowledge among multidisciplinary groups; fostering student and faculty mobility; and boosting interculturality, multidisciplinary thinking, the exchange of good practices, and research addressing shared challenges and promoting international cooperation [45]. Thus, European University Alliances promote the mainstreaming of ESD as an integral part of higher education in Europe [46]. This has long-term impacts, as more graduates are expected to be ready to face the challenges related to sustainable development [43,46].

In 2019, the EC selected the first 17 European University Alliances, and in 2020, 24 alliances were financed through the Erasmus+ program. Currently, in Europe, there are a total of 50 European University Alliances spread across different capitals and remote regions of 35 EU member states, in addition to more than 430 education institutions in Iceland, the Republic of North Macedonia, Norway, Serbia, Turkey, Albania, Bosnia and Herzegovina, and Montenegro as part of the University Alliances. However, the diversity of the alliances goes beyond this, with non-governmental organizations (NGOs), businesses, local and regional authorities, and some 1700 partners being linked to the alliances, with enormous potential to attract innovation and research in the different regions of Europe [47].

European University Alliances are committed to the integration of education, research, and innovation to address societal challenges, promoting students' professional competencies through practical experience, the formation of a business and entrepreneurial mindset, civic engagement, and revolutionizing the quality and competitiveness of European higher education. University partnerships represent a revolutionary step in international cooperation in the education sector, offering different visions, models, and best practices but above all resilience in a changing world that needs us to constantly adapt to new challenges [47].

1.4. EELISA

European Engineering Learning Innovation and Science Alliance (EELISA) is an alliance of higher education institutions in the field of engineering and technology, with the main objective of implementing a common European engineering model through the creation of the so-called EELISA communities. The Alliance is coordinated by Universidad Politécnica de Madrid (UPM) and brings together ten universities in Europe: Budapest University of Technology and Economics (BME), École des Ponts ParisTech (ENPC), Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU), Istanbul Technical University (ITU), Scuola Normale Superiore (SNS), Scuola Superiore Sant'Anna (SSSA), Polytechnic University of Bucharest Universitatea Politehnica din București (UPB), Paris Sciences et Lettres University, and Zurich University of Applied Sciences (ZHAW) [46,48].

EELISA's mission is the transformation of European higher education and the strengthening of the links between engineering and society through the following:

- Re-inventing the “European engineer”.
- Democratizing engineering education.
- Evolving interdisciplinary engineering learning.
- Encouraging knowledge, skills, and technology transfer.
- Fostering inclusiveness and diversity.
- Making a real impact on society following the 2030 Agenda for Sustainable Development and the SDGs.

As an alliance of universities of technology and engineering, one of EELISA's goals is to develop a European engineer profile. Most international standards for engineer profiles

stress the importance of basic scientific concepts, such as understanding, practice, design, research, knowledge, methods, and complexity, but few mention how mobility, diversity, and multiculturalism can help to improve learning throughout a career [46].

In line with the above, EELISA's ambition is to create a common European engineer profile that not only includes high-level technical and scientific competencies but also encompasses more inclusive, interdisciplinary education and training committed to society and its new challenges, such as the green and digital transition, with environmental, social, and multicultural competences. The profile of the European engineer is based on four fundamental pillars: an elevated level of scientific, theoretical, and digital skills; addressing sustainability and interculturalism; an engineer embracing the European project; business and communication skills, critical thinking, and practical and applied knowledge [46].

In summary, the Alliance seeks to create academic excellence, innovation, and social commitment for societies to thrive with smart and sustainable solutions powered by European engineering. The Alliance believes in gender balance in STEM careers; sustainable mobility; and cooperation among students, academics, and external agencies as the foundations of European higher education [43,46].

1.5. EELISA Communities

The EELISA Communities are university networks that seek to generate multidisciplinary spaces and encourage the inclusion of different actors, such as academics, students, and external partners (such as companies, public institutions, and NGOs), to find innovative solutions to global challenges. An EELISA community is a collaborative platform made up of universities in the EELISA network that share a common interest and are generators of learning, research, and innovation activities, based on the resolution of problems or challenges in different fields of application. Forty-eight EELISA Communities are currently active [49].

1.5.1. Circular EELISA Community

The Circular Community is a space that welcomes students, academics, and stakeholders with the aim to promote a mindset that favours the transition to a circular economy, fostering social, citizenship, and sustainability competencies to meet the challenges of the future. The Community seeks to make visible the social responsibility and strategic role of higher education in meeting the challenges of the UN Sustainable Development Goals. The Circular Community promotes the 17 SDGs, considering the circular economy mentality that is promoted. SDG 11 (sustainable cities and communities) and SDG 12 (responsible consumption and production) are identified as main objectives, while SDG 4 (quality education), SDG 6 (clean water and sanitation), SDG 7 (affordable and clean energy), SDG 13 (climate action), and SDG 17 (partnerships for the goals) are considered secondary objectives; however, the Community also has an indirect positive impact on the SDGs as a whole [50].

The Community is formed by the alliance of five universities, ITU, UPM, UPB, SSSA, and ENPC, with the aim of developing resources to promote the incorporation of a mindset that favours the transition to the circular economy, addressing the social, citizenship, and sustainability competencies of future professionals. The members of the Circular EELISA Community share a common vision of the social responsibilities of higher education and the strategic role that it should play in addressing sustainability challenges. Through circular activities such as webinars, seminars, workshops, and summer courses, among other activities, the Community fosters interest in research and innovation in the circular economy [50].

1.5.2. EELISA Credentials

The Alliance has a recognition system that rewards student participation and certifies the acquisition of skills, competencies, and work in international environments in various formats. EELISA credentials are the "academic materialization" of students' participation

in the activities and learning experiences promoted by EELISA communities, a kind of passport certified by the universities of the Alliance, where the evidence “badges” that students acquire, regardless of their country of origin, institution, or academic cycle (bachelor’s, master’s, and PhD), are collected. The certification allows students to demonstrate their level of commitment to the SDGs and their efforts to create a real impact on society. Each EELISA badge is linked to an activity or experience, and its impact depends on the type and involvement of the participant; each badge is composed of three characteristics [48,51,52]:

1. A Sustainable Development Goal (SDG) defined by the UN;
2. An EELISA impact level (see Table 2 below);
3. A learning objective (LO) related to the SDGs.

Table 2. EELISA impact levels.

Impact Level (Number)	Impact Level	Example of Impact Level Associated with an Experience/Activity
1	Discovery	Conference/roundtable/seminar.
2	Knowledge	Cycle of conferences/MOOC/workshop/summer course.
3	Commitment	Case studies (through desktop research, excursions, interviews, etc.)
4	Action	Group work with the production of deliverables.
5	Transformation	Impact project with demonstrable KPIs (funds raised, populations reached, stakeholder engagement. . .)

The activities or experiences coordinated by the Circular EELISA Community are oriented toward one or several Sustainable Development Goals with a greater or lesser impact level and based on a learning objective. At the end of the activity, participants receive a certificate or badge accrediting their participation, the related SDG, and the level achieved. This system allows for the progressive enrichment of the student’s “passport” throughout their academic career; this form of standardized recognition allows the student to have a vision of their progress in terms of social, citizenship, and sustainability competencies and skills promoted by the Circular EELISA Community, which complement academic training [48,51,52].

However, due to the short life of EELISA and, even more so, the Circular EELISA Community, scientific research on its contribution to and impact on ESD and the SDGs has not yet been developed. Two years after its birth, we consider that it is time to evaluate its implications in sustainable development and check if it is fulfilling its objectives of training engineering students with socio-civic commitment. Therefore, we present the following study developed with the main objective of analysing the contribution of the Circular EELISA Community to ESD and the SDGs. As a first secondary objective, in this study, it was proposed to analyse, by impact level, the contribution of the Circular EELISA Community to the achievement of the SDGs. The second specific objective was to analyse the annual contribution of the Circular EELISA Community to the achievement of the SDGs.

2. Materials and Methods

The research team chose the Circular EELISA Community for their study not only due to its dedication to the SDGs but also because the authors are associated with this community, making it easier to access information.

To analyse the contribution of the Circular EELISA Community to sustainability, a quantitative study was conducted using the statistical analysis program RStudio (version 2023.06.01).

The data used in this study were provided by the Circular EELISA Community. There were two types of data: On the one hand, qualitative data were composed of the name of the activity that the Circular EELISA Community carried out and the acronym of the host university of the activity—ITU, UPM, UPB, SSSA, and ENPC. The data used in this study were provided by the Circular EELISA Community. On the other hand, the quantitative data were composed of the month and year in which the activity was carried out, the

number of the SDG on which each specific activity focused, its corresponding impact level, the number of badges awarded, and the number of students who were awarded said badge. The name of the activity was chosen according to the main theme of each one.

Although the Circular EELISA Community was created in 2021, for this study, activities conducted in the period between 2022 and 31 July 2023 were chosen. Activities before 2022 were not included, as the Circular Community had not yet launched EELISA credential recognition.

It is assumed that activities with the highest number of participants, the highest number of badges awarded, and the highest impact level represent the greatest contributions to the achievement of the SDGs and ESD.

Statistical Analysis

The following actions were carried out to perform statistical analyses in the RStudio program, version 2023.06.01.

A first descriptive statistical analysis was carried out to accurately determine the contribution that the Circular EELISA Community has made towards the achievement of the SDGs. In this analysis, the cumulative frequency of EELISA badges awarded in all Circular EELISA Community activities was examined, and the activities were classified according to each of the SDGs to which they were addressed.

To analyse the contribution of the Circular EELISA Community to the SDGs according to the impact level, a second phase was conducted in the descriptive statistical analysis. In this case, it was decided to examine the cumulative frequency of EELISA badges awarded in all Circular EELISA Community activities focused on each of the SDGs, this time by analysing the data by impact level. The impact level of each activity was chosen according to the type of experience and level of knowledge acquired.

Thirdly, to analyse the annual contribution of the Circular EELISA Community to the SDGs, we carried out a descriptive statistical analysis of the cumulative frequency of EELISA badges awarded in all Circular EELISA Community activities focused on each of the SDGs, this time differentiating between the activities that took part in 2022 and the activities developed until 31 July 2023.

3. Results

This section presents the results obtained after the analysis of the data. First, it presents the data extracted on the activities carried out between 2022 and July 2023 by the Circular EELISA Community in the form of a descriptive table (Table 3).

In the present study, a total of 19 activities in which 533 students participated were recorded. Student participation in these activities varied, ranging from small groups of 3 students to larger groups of 130 students. Following the participation of the 533 students in the activities, a total of 1414 badges focused on 10 different SDGs were delivered, specifically SDGs 1, 4, 5, 7, 8, 9, 11, 12, 13, 17. The badges awarded belonged to impact levels 1, 2, 3, and 4; so far, no badge with impact level 5 has been awarded.

The following table (Table 4) shows a summary description of the impact level and the number of corresponding activities in the Circular EELISA Community for each of these levels. At impact level 1, six activities were identified. On the other hand, the activities with impact level 2, which indicates a greater degree of influence on the SDGs, were 11 in total. Likewise, eight activities with impact level 3 were registered, which suggests that although the number of activities with impact level 1 was higher, the eight activities with impact level 3 remained the most significant in the development of the SDGs. At level 4, six additional activities were identified, indicating a relevant impact on the SDGs.

Table 3. Descriptive table of the activities of the Circular EELISA Community.

a	b	c	d	e	f	g	h	i	j	k	l	m	n
1	Circular Roundtable	4	2022	17	11	2	17	12	2	17			
2	3VIA	9	2022	23	4	1	23	12	2	23			
3	Scape room	11	2022	24	11	1	24	12	2	24			
4	Cocreation Session	11	2022	16	11	4	16	12	4	16			
5	Be Circular Webinars 1	10	2022	7	4	1	7	8	1	7	12	1	7
6	Infographics design 1	12	2022	9	11	3	9	12	3	9			
7	Connecting women	12	2022	35	5	3	35	7	3	35	13	3	35
8	Infographics design 2	10	2022	9	4	2	9	12	4	9			
9	ENLIGHT	10	2022	28	11	2	28	12	2	28			
10	R Express	3	2023	24	1	2	24	13	1	24			
11	Infographics design 3	3	2023	3	4	2	3	12	4	3			
12	Be Circular Webinars 2	3	2023	35	4	1	22	12	1	35	12	3	12
13	R Mechanisms	1	2023	14	4	2	14	12	1	14	12	3	14
14	Waste terrain	4	2023	15	11	3	15	12	3	15			
15	ATHENS Course	3	2023	19	4	3	19	12	4	57			
16	Workshop waste	3	2023	17	9	3	17	12	3	17	12	4	17
17	Geopolymers workshop	3	2023	130	9	2	130	11	2	130	12	2	130
18	Role Game	6	2023	69	9	2	69	11	2	69	17	2	69
19	HIQUAKE	7	2023	39	11	2	39	11	3	39	17	4	39

a Number of the activity; b activity name; c month; d year; e No. of participants; f SDS (1); g impact level; h No. of badges; i SDS (2); j impact level; k No. of badges; l SDS (3); m impact level; n No. of badges.

Table 4. Impact level and number of activities per impact level.

Impact Level	No. of Activities
1	6
2	11
3	8
4	6
5	0

3.1. Sustainable Development Goals in the Circular EELISA Community

After completing the initial stage of descriptive statistical analysis, as described in the methodology section, we obtained the results presented below.

Figure 1 shows, in the form of a bar chart, the cumulative frequency of the EELISA badges awarded throughout all the activities carried out in the Circular EELISA Community and their distribution among the SDGs on which each of the activities was focused.

Figure 1 clearly shows that the main contribution (more than 200 badges) of the Circular EELISA Community to the SDGs was given to SDG 12, with 445 badges, followed by SDG 11, with almost 386 badges, and SDG 9, with 216 badges. It also presents moderate contributions (50 to 120 badges) given to SDG 17, with 108 badges; SDG 13, with 59 badges; and SDG 4, with 97 badges. Finally, the SDGs to which the Circular EELISA Community contributed to a lesser extent were SDGs 1, 5, 7, and 8, with contributions of 24, 35, 35, and 7 badges, respectively.

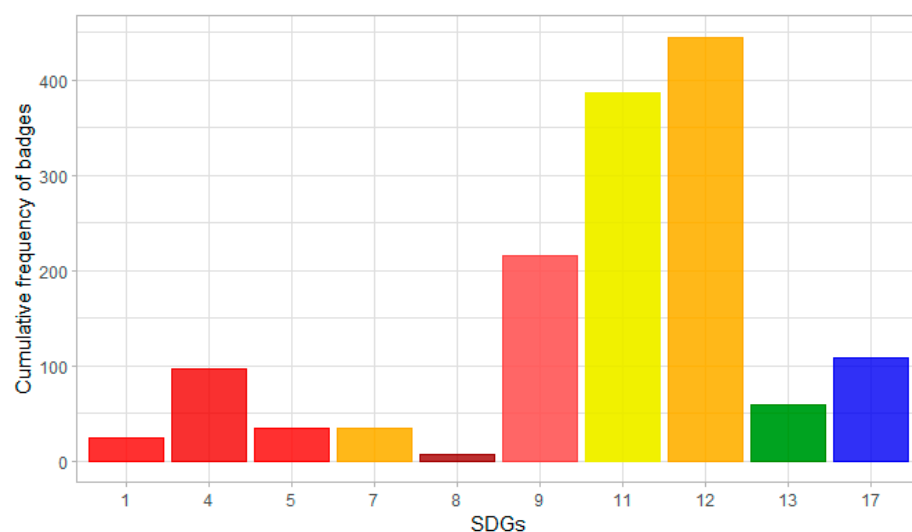


Figure 1. Cumulative frequency of badges by Sustainable Development Goals. ODS (x-axis) and cumulative frequency of badges (y-axis). The colors represented are those associated with each SDG.

3.2. Sustainable Development Goals in the Circular EELISA Community by Impact Level

After the second phase of the descriptive statistical analysis explained in the methodology section, we obtained the results presented as follows.

Four bar charts were obtained (visible in Figure 2), with each representing the cumulative frequency of the EELISA badges awarded in all the activities of the Circular EELISA Community, differentiating among the five impact levels. The analysis shows four bar charts, as there were no badges of impact level 5 awarded. The top histogram in Figure 2 represents impact level 1, followed below by the histograms representing impact levels 2, 3, and 4, respectively.

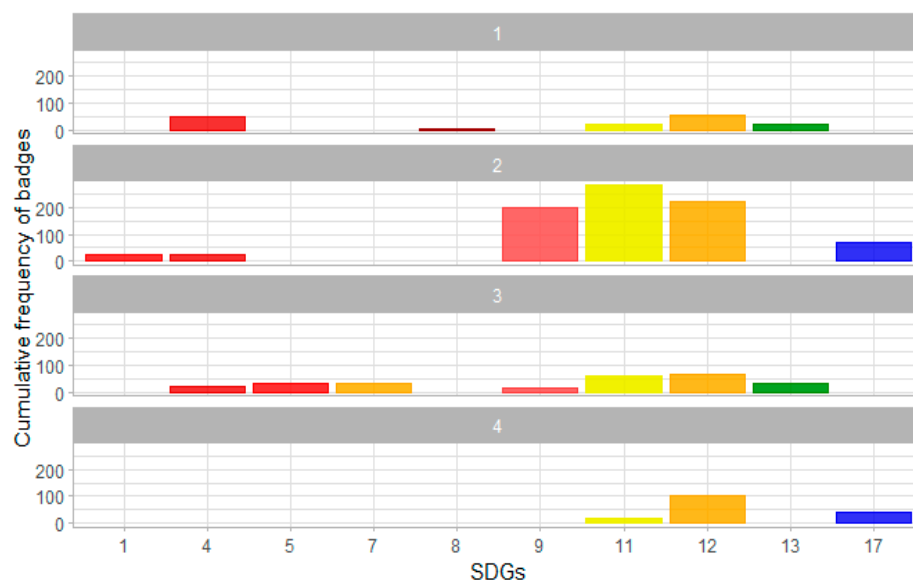


Figure 2. Cumulative frequency of badges for each impact level and Sustainable Development Goals. ODS (x-axis) and cumulative frequency of badges (y-axis). The colors represented are those associated with each SDG.

Figure 2 visualizes how most of the badges were awarded at impact level 2, with a total of 821 badges spread over 11 activities (Table 4), followed by impact level 3, with a total of 271 badges in 8 activities (Table 4); impact level 1, with 163 badges in 6 activities (Table 4); and finally impact level 4, with 157 badges awarded in 6 activities (Table 4).

Regarding the distribution of the SDGs by impact level, level 4 was the one that obtained the greatest diversity in the number of different SDGs, with badges distributed among SDGs 4, 5, 7, 9, 11, 12, and 13. It was followed by impact level three, which, although it was the one with the highest number of badges awarded, was in second position in terms of SDG diversity, with badges being distributed among SDGs 1, 4, 3, 11, 12, and 17. In third position was impact level 1, with badges being awarded for SDGs 4, 8, 11, 12, and 13. Finally, impact level 4 had the least diversity in SDGs, as well as in the number of badges awarded, with badges spread among SDGs 11, 12, and 17.

SDGs 11 and 12 were those in which the four levels of impact were achieved, followed by SDG 4, which reached levels of impact 1, 2, and 3. The rest of the SDGs were divided between at least two different impact levels (SDGs 9, 13, and 17) and a single impact level achieved (SDGs 1, 5, 7, and 8).

3.3. Sustainable Development Goals in the Circular EELISA Community by Year

After the third phase of the descriptive statistical analysis explained in the methodology section, we obtained the results presented as follows.

Two bar charts were obtained (visible in Figure 3), with each representing the cumulative frequency of EELISA badges awarded in all Circular EELISA Community activities, differentiating between the activities carried out in 2022 and the activities carried out until 31 July 2023. The top histogram in Figure 3 shows the cumulative frequency of badges awarded in the year 2022 (9 Circular EELISA Community activities; Table 3), and the histogram below shows the cumulative frequency of badges awarded in the year 2023 (10 Circular EELISA Community activities; Table 3).

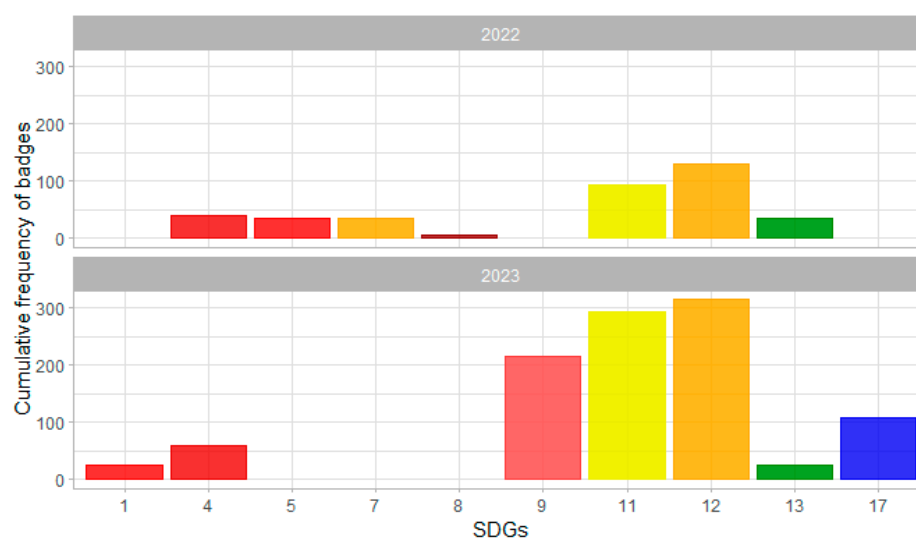


Figure 3. Cumulative frequency of badges per year and Sustainable Development Goals. ODS (x-axis) and cumulative frequency of badges (y-axis). The colors represented are those associated with each SDG.

Only activities aimed at SDG 1 were focused on in 2023, receiving a total of 24 badges in that year, while in 2022, 39 badges were awarded for SDG 4, and in 2023, this SDG received greater support, with 58 badges. SDGs 5, 7, and 13 were only supported through activities carried out in 2022, obtaining 35 badges each. Similarly, SDG 8 was only supported in the same year, with seven badges, with this being the SDG that was least supported by the Community. Although, in 2022, no activity focused on SDG 9, in 2023, 216 badges were distributed for this same SDG, which positioned itself as the third most impacted objective between the two years. SDG 11 and SDG 12 were the objectives that the Circular EELISA Community focused on supporting in both years. The Community awarded 94 badges for SDG 11 in 2022 and 292 in 2023, while 131 SDG 12 badges were distributed in 2022, and 314,

in 2023. Finally, students obtained 108 SDG 18 badges in 2023, showing, that year, greater commitment to that particular goal.

4. Discussion

The first descriptive analysis of the data was intended to meet the overall objective of the study. The analysis, which was based on data obtained from the Circular EELISA Community, allowed us to observe the level of contribution of the Community to the different SDGs.

The results show how in each of the analyses, it is shown that the SDGs most supported through activities of the Circular EELISA Community are SDG 9 (industry, innovation, and infrastructure), SDG 11 (sustainable cities and communities), and SDG 12 (production and consumption), coinciding with the SDGs on which the Community focuses, since they are two of the SDGs that support a circular economy the most. The analysis also highlights the contributions to SDG 4 (quality education), SDG 13 (climate action), and SDG 17 (partnership for the goals), coinciding with three of the five SDGs on which the Community focuses its actions. The other four SDGs, SDG 1 (no poverty), SDG 5 (gender equality), SDG 7 (affordable and clean energy), and SDG 8 (decent work and economic growth), obtained fewer contributions from the Community, which can be explained by the fact that the Community only focuses on developing SDG 7 out of the four Goals mentioned. However, SDG 6 (clean water and sanitation), which the Community proposes as a secondary SDG, does not appear in the results of the analysis.

The second descriptive analysis shows that the Community made its greatest contribution to the SDGs through activities focused on achieving levels 2 and 3 of the EELISA credential system. This means that through level 2, its participants have reached the necessary level to acquire knowledge and thus help in the development of the SDGs. On the other hand, participation in level 3 activities means that students have committed to those goals.

The absence of activities with impact level 5, which requires the participant to transform their social and citizen environment, suggests that reaching this level is complicated to achieve and requires significant effort and more time. Perhaps, in the future, the Community should focus its efforts on developing activities that allow for such commitment, even if this means carrying out fewer activities per year or covering reduced student groups.

Through the third descriptive analysis, it is shown that, in just half a year, the Circular EELISA Community managed to conduct a greater number of activities than in the previous year, also recognizing a greater number of badges. Therefore, it is expected that the contribution of the Circular EELISA Community to the achievement of the SDGs will increase over time.

This study constitutes an innovative input to the current literature, addressing, from an empirical perspective, the lack of studies and evaluations on the true contribution of universities, as well as EELISA, to the SDGs [53]. There are few empirical studies in the literature: In the research by Chaleta [26], they map the contribution to the SDGs of the departments of University of Évora through courses that focused on one or more SDGs. De la Poza [53] analyses the scientific publications disseminated by universities of The Times Higher Education World University Ranking. Vasiliki [54] evaluates the SDGs by analysing the learning outcomes of different university programs according to attributes. Laurie [27] discusses the contribution of education to the SDGs at different levels of education through qualitative research including interviews with education experts.

The results obtained in the study are not comparable to antecedents found in the literature review, as there is no homogeneity in the procedures for the analysis of the contribution of universities to the SDGs and ESD due to the reporting literature being limited to single-case studies [17,26,27,35,54]. Therefore, an important limitation arises when it is intended to apply the methodology developed in any of the previous studies to this context.

However, if the purpose is to apply the EELISA credential procedure in other educational contexts outside the Alliance, an important problem arises: most of the curricula are not adapted to or focused on specific SDGs as in the case of EELISA [51]. This makes it difficult for education to be concretely oriented towards any of the SDGs through its curricular content [23,26,35,55]. A solution could be for European universities to implement EELISA badges in their study curricula, following the example of the universities participating in the European project Circular & Socio-Civic Learning Virtual Hub (CIRC.LE), which have already successfully adopted the EELISA credential recognition system [51,56].

To enhance the accuracy of the findings, it is recommended to improve the data collection process and reduce the potential bias of the results. In addition, it is recommended to conduct a comprehensive literature review that addresses methodologies for assessing the contribution of higher education to ESD and the SDGs. Such review could allow us to unify a common and reference methodology, which could give us a deeper understanding of the true impact of higher education on sustainable development.

5. Conclusions

The main aim of this study was to analyse how the Circular EELISA Community is contributing to ESD and the SDGs. To achieve this, we conducted an analysis of the number of EELISA badges awarded for community activities carried out in the last two years. Our findings suggest that the Circular EELISA Community has made a positive contribution to ESD and the SDGs. The Circular EELISA Community is committed to contributing to the achievement of SDGs 11 and 12, which are closely related to the circular economy. However, in the future, the Community should also focus on promoting Circular Experiences that align with SDG 6 to better achieve its goals. Over time, the Community has grown significantly, attracting a larger number of students and organizing activities with greater impact.

Addressing the SDGs from a systemic perspective is crucial. However, developing tools can help us deepen our understanding of the concept of sustainable development, which can sometimes be ambiguous. This study aims to provide students, education professionals, politicians, and anyone interested with the necessary competencies and pedagogies to empower citizens to meet global environmental priorities from socioeconomic and technological perspectives. We can only achieve a transformation towards a sustainable future if all universities in Europe participate as one.

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