Assessing the provisions for sustainability in economics degree programmes

Walter Leal Filho
Department of Natural Sciences, Manchester Metropolitan University, Manchester, UK and European School of Sustainability Science and Research (ESSSR), Hamburg University of Applied Sciences, Hamburg, Germany

Maria Alzira Pimenta Dinis
UFP Energy, Environment and Health Research Unit (FP-ENAS), University Fernando Pessoa (UFP), Porto, Portugal and Fernando Pessoa Research, Innovation and Development Institute (FP-I3ID), University Fernando Pessoa (UFP), Porto, Portugal

Maria F. Morales
Department of Economic Analysis, Faculty of Economics and Business, University of Murcia, Murcia, Spain

María Semitiel-García and Pedro Noguera-Méndez
Department of Applied Economics, Faculty of Economics and Business, University of Murcia, Murcia, Spain

Salvador Ruiz de Maya and María-del-Carmen Alarcón-del-Amo
Department of Marketing, Faculty of Economics and Business, University of Murcia, Murcia, Spain, and

Nuria Esteban-Lloret and María Pemartín
Department of Business Organisation and Finance, Faculty of Economics and Business, University of Murcia, Murcia, Spain

Received 28 August 2023
Revised 18 October 2023
22 November 2023
30 November 2023
Accepted 30 November 2023

Abstract

Purpose – Higher education institutions (HEIs) offer courses and programmes focusing on sustainability in economics, as courses on sustainable development (SD), which examine the economic, social and environmental dimensions of SD. This paper aims to examine sustainability integration in economics degree programmes.

Design/methodology/approach – Through an extensive literature review in Web of Science (WoS) and information search in Google, conducting to 28 relevant case studies, this paper elucidates the emphasis given to sustainability as part of economics degree programmes in HEIs.

Findings – The results suggest that, whereas the inclusion of sustainability components in this field is a growing trend, much still needs to be done to ensure that matters related to SD are part of the routine of university students studying economics.

This paper is part of the "100 papers to accelerate the implementation of the UN Sustainable Development Goals" initiative. This is an initiative being disseminated worldwide.

Data availability: All data generated or analysed during this study are included in this published article.

Competing interests statement: The authors declare no competing interests.

International Journal of Sustainability in Higher Education

1467-6370
DOI 10.1108/IJSHE-08-2023-0382

Research limitations/implications – It is worth noting that the literature review conducted in WoS was primarily aimed at assisting in the selection of university case studies. The 28 university case studies scrutinised in this study may lack sufficient representation from numerous developing countries.

Practical implications – This study highlights challenges in integrating the SD into economics degree programmes, suggesting the need for curriculum adjustments as underscoring operational issues, acting as barriers. The inclusion of sustainability in economics programmes must navigate operational issues stemming from packed timetables and busy schedules, requiring innovative solutions.

Social implications – As far as the authors are aware, this study holds substantial importance in its emphasis on implementing sustainability within HEIs' economics programmes, assisting in pursuing SD.

Originality/value – The novelty of this study lies in addressing sustainability with the specific economics focus programmes within the HEIs context.

Keywords Sustainability, Provisions, Economics degree programmes, Higher education institutions (HEIs), Sustainable development (SD), Case studies

Paper type Research paper

1. Introduction

The United Nations (UN) 2030 Agenda sets 17 Sustainable Development Goals (SDGs) to shift the economy towards sustainability (United Nations, 2015a). Higher education institutions (HEIs) are bound to have a prominent role (Leal Filho *et al.*, 2019). Sustainable Development Solutions Network, SDSN (2015), backs universities, enabling unique SDGs implementation and Education for Sustainable Development (ESD) (Shiel *et al.*, 2020). Education is a distinct goal (SDG4), connecting to nearly all goals in various ways (Leal Filho *et al.*, 2019). SDSN emphasises that no SDG is likely achieved without university involvement (SDSN, 2017, p. 3), acknowledged in studies (Leal Filho *et al.*, 2023a, 2023b, 2023c, 2023d, 2023e, 2023f, 2023g, 2023h; Leal Filho *et al.*, 2023a, 2023b, 2023c, 2023d, 2023e, 2023f, 2023g, 2023h; Leal Filho *et al.*, 2023a, 2023b, 2023c, 2023d, 2023e, 2023f, 2023g, 2023h; Leal Filho *et al.*, 2022a, 2022b, 2022c, 2022d, 2022e, 2022f; Leal Filho *et al.*, 2021a, 2021b; Leal Filho *et al.*, 2022a, 2022b, 2022c, 2022d, 2022e, 2022f; Leal Filho *et al.*, 2023a, 2023b, 2023c, 2023d, 2023e, 2023f, 2023g, 2023h; Leal Filho *et al.*, 2022a, 2022b, 2022c, 2022d, 2022e, 2022f; Leal Filho *et al.*, 2022a, 2022b, 2022c, 2022d, 2022e, 2022f; Leal Filho *et al.*, 2022a, 2022b, 2022c, 2022d, 2022e, 2022f).

SDGs' university involvement is explored in literature (Fauzi *et al.*, 2022). Universities primarily address SDGs through research and education (Alcántara-Rubio *et al.*, 2022), emphasising social goals, rather than economic and ecological ones (Vogel and Breßler, 2022). SDGs need to be integrated in universities through curriculum integration, training actions and strategic mission focus (Serafini *et al.*, 2022).

Recent studies explore how HEIs contribute to society (Leal Filho *et al.*, 2023a, 2023b, 2023c, 2023d, 2023e, 2023f, 2023g, 2023h), with sustainability research focusing on education, sustainable cities and climate change (CC) (Salvia, Leal Filho *et al.*, 2019). Universities can align with SDGs, emphasising renewable energy and carbon emission reduction in campus operations (Gui *et al.*, 2021; Leal Filho *et al.*, 2023a, 2023b, 2023c, 2023d, 2023e, 2023f, 2023g, 2023h; Leal Filho *et al.*, 2021a, 2021b; Leal Filho *et al.*, 2023a, 2023b, 2023c, 2023d, 2023e, 2023f, 2023g, 2023h; Logan *et al.*, 2020). SDGs can also be integrated into civic engagement and community outreach (Leal Filho *et al.*, 2022a, 2022b, 2022c, 2022d, 2022e, 2022f; Leal Filho *et al.*, 2022a, 2022b, 2022c, 2022d, 2022e, 2022f; Leal Filho *et al.*, 2019). SDGs can be integrated institution-wide or in specific courses/disciplines at macro and micro levels, respectively (Fia *et al.*, 2022).

Macro level efforts include integrating sustainability training in the Spanish University System (Albareda-Tiana *et al.*, 2020) or inter-university collaborations in Africa (Nyerere *et al.*, 2021). Most publications focus on designing courses and transforming curricula to address the SDGs (Fekih Zguir *et al.*, 2021; Weiss *et al.*, 2021). Most focus on SDG4 via ESD,

aiming to foster a sustainable culture (Fia *et al.*, 2022). Many institutions lack emphasis on SDGs and provide limited training for university staff (Leal Filho *et al.*, 2023a, 2023b, 2023c, 2023d, 2023e, 2023f, 2023g, 2023h). Authors propose frameworks and tools for systematically integrating SDGs into university programs (Albert and Uhlig, 2021; Ferrer-Estévez and Chalmeta, 2021; Kioupi and Voulvoulis, 2020; Leal Filho *et al.*, 2021a, 2021b).

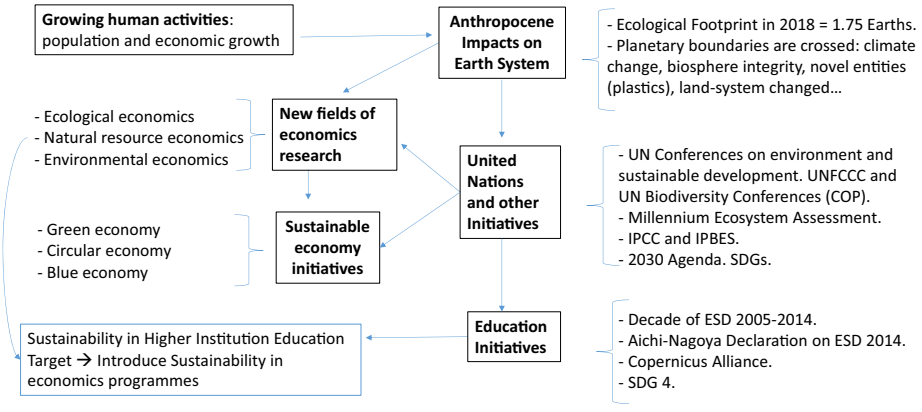
Incorporating sustainable development (SD) in university education fosters student learning and skills for their degrees. Studies in engineering explore the integration of SDGs into study programmes (Álvarez *et al.*, 2021; Beagon *et al.*, 2022; Sigahi and Sznelwar, 2023; Zanitt *et al.*, 2022). Disciplines are integrating crucial sustainability skills into their curricula using innovative methods and technologies (Baena-Morales *et al.*, 2022; Hübscher *et al.*, 2022; Kanapathy *et al.*, 2021; Stough *et al.*, 2021). Examples include work-integrated learning, real-life university experiences to enhance sustainability competencies (Alm *et al.*, 2022) and student-led initiatives for SDGs-related activities to boost engagement (Lee *et al.*, 2023). Active methodologies are reported as effective tools for sustainability training (Carrió Llach and Llerena Bastida, 2023; Martínez Valdivia *et al.*, 2023).

Research on integrating sustainability into business education recognises the significance of corporate social responsibility and socially responsible investment (Greer and Bruno, 1996; Lydenberg, 2014; Martínez-Campillo and Fernández-Gago, 2014). Some business schools adopt the UN Principles of Responsible Management Education (UNPRME), adjusting curricula to address SDGs and uphold sustainability, responsibility and ethics (Martins *et al.*, 2023). Limited attention is given to incorporating sustainability into economics (García-Feijoo *et al.*, 2020).

This study fills a knowledge gap by examining how economics education programmes address sustainable policy-making globally, analysing constraints.

2. Sustainability in economics programmes

The current environmental crisis stems from population and economic growth long ago (Figure 1), intensifying resource and ecosystem service use (Millennium Ecosystem



Source: Authors' own elaboration, based on data from Millennium Ecosystem Assessment Board (2005a), Millennium Ecosystem Assessment Board (2005b), Will Steffen *et al*. (2005), UNESCO (2005b), Rockstrom *et al*. (2009), Alliance Copernicus (2011), W. Steffen *et al*. (2015), Crutzen and Stoermer (2017), Persson *et al*. (2022), International Society for Ecological Economics (n.d.), OECD (n.d.), Stockholm Resilience Centre (n.d.) and The Blue Economy (n.d.)

Figure 1.
Key role of the economy in unsustainability and in the transition to sustainability

Assessment Board, 2005a, 2005b; Will Steffen *et al.*, 2005). The economic system's role in environmental degradation was noted already in the Brundtland (1987) report. Human-induced global transformations led to the acceptance of the new Anthropocene era (Will Steffen *et al.*, 2005; UNDP, 2020). The ecological footprint (Wackernagel and Rees, 1996) surpassed Earth's capacity in 1970, reaching 1.75 Earths in 2018 (Figure 1). Sustainability requires limits due to planetary boundaries (Holden *et al.*, 2017), some already exceeded, contributing to CC, biosphere integrity loss and pollution (Persson *et al.*, 2022; W. Steffen *et al.*, 2015; Will Steffen *et al.*, 2005).

Since 1972, the UN has championed initiatives addressing environmental issues and SD (Figure 1), including the IPCC (1988), Rio Conference (United Nations, 1992), Agenda 21 (UNCED, 1992; Millennium Ecosystem Assessment, 2000), Millennium Development Goals (United Nations, 2000), Decade of ESD 2005–2014 (UNESCO, 2005a) and the 2030 Agenda with its 17 SDGs in 2015 (United Nations, 2015b). Economics' pivotal role is evident in these pro-environmental efforts, as emphasised in literature (Costanza and Daly, 1987; Dasgupta, 2021; Folke *et al.*, 2021; Millennium Ecosystem Assessment Board, 2005a, 2005b). The economy's contribution is crucial in addressing social sustainability challenges. Initiatives like the green economy (UNEP, 2017) and circular economy (Stahel, 2016) aim to transform the system for advancing sustainability. The economy plays a key role in the three pillars of sustainability: economic, social and environmental (Purvis *et al.*, 2019). Economics now includes environmental considerations, giving rise to fields like ecological and environmental economics (Figure 1), supporting Polasky *et al.* (2019) assertion that economics should centrally contribute to addressing the SD challenge.

Integrating sustainability into economics education offers benefits beyond the sustainable transition (UNESCO, 2017). ESD is essential in all university degrees, with programme adaptation fostering pro-environmental changes. Economics degrees involvement is crucial for sustainability (Figure 2), with economists leading in policy-making for SD strategies. Arrows in Figure 2 indicate pro-environmental influences spreading to markets, society and the biosphere, highlighting SD learning dynamics (UNESCO, 2018).

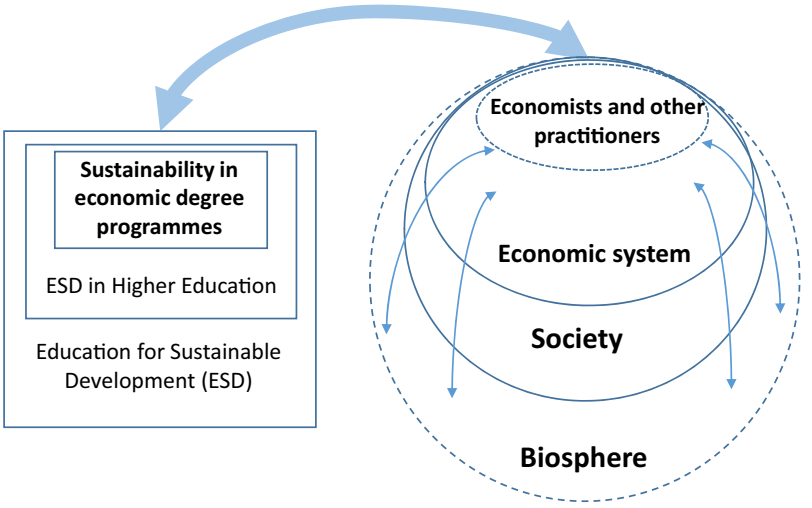


Figure 2.
Potential impact of introducing sustainability in economic education programmes on SD

Source: Author's own work

To address the sustainability crisis and meet international commitments (UNESCO, 2005a, 2005b, 2017; United Nations, 2023b). Accordingly, this study focuses on economics programmes acknowledging significant overlaps with business programmes. Economics programmes offer a broader theoretical perspective, justifying the distinct focus.

Changing how sustainability is taught is crucial, with transformative learning (Davelaar, 2021; Mezirow, 1997; Sterling, 2011) going beyond theoretical aspects, impacting worldviews and values (Sterling, 2011). Considering sustainability's depth and complexity, it is vital to examine its integration into economics programmes.

3. Materials and methods

This study is motivated by worldwide efforts in HEIs for SD, aligned with various SDGs, particularly SDG4, SDG13, SDG16 and SDG17 (International Association of Universities (IAU), 2023; United Nations, 2023a, 2023c). The study focuses on SDG4, particularly target 4.7. Specifically, indicator 4.7.1 assesses the integration of global citizenship education (GCED) and ESD in national policies, curricula, teacher education and student assessment (United Nations, 2023b). Aligned with global SD efforts and inspired by various SDGs, this research addresses the knowledge gap on sustainability integration in HEIs within economics.

In the initial literature review phase, a thorough bibliometric analysis was conducted on the Web of Science (WoS) database, using a search string to identify peer-reviewed publications on sustainability, economics, education/training and universities. Boolean operators like AND and OR were used for a focused search. The search string aimed to gather comprehensive information, as a more restrictive search yielded limited results: TS = ((“sustainability” or “SDG” or “SDGs”) and (“economics”) and (“education” or “training” or “curricula” or “curriculum”) AND (“universit*” OR “higher education institut*”).

Figure 3 displays publications categorised by WoS classification, stemming from the initial literature search for case studies. Only categories with over 5 articles were considered. Larger rectangles indicate a higher proportion of publications in the WoS category, with the number inside representing the total publications by discipline. The “Education Educational Research” category encompasses 71 publications, and the “Economics” category has 15. All publications in these categories were thoroughly examined. For others, titles and abstracts

Source: Author's own work

Figure 3. Tree map chart of publications grouped by WoS (2023) categories, with more than five publications in each category

were reviewed, and if relevant to the research focus, full analysis was conducted. The search on March 18, 2023, yielded 156 articles, mentioning universities later analysed.

The second method involved using Google to find universities offering sustainability in economics degrees. Google, the globally top-ranked search engine according to Alexa (2023), was selected for its popularity. This rank justifies Google's use as a reliable search engine. A search on March 20, 2023, using terms like "sustainability", "economic" and "degree" yielded 132 million results. Google's algorithm prioritises relevant and authoritative search results. This implies top-notch results usually show on the first search page (Brake, 2017). Analysing the first SIX pages (60 universities), the search was halted as results deviated from the research objective. While WoS provides excellent results, Google's accessibility and broader coverage make it ideal for extensive searches. Combining both systems is recommended for comprehensive coverage (Brophy and Bawden, 2005).

A total of 28 relevant university case studies were gathered from literature (WoS) and university websites (Google) to illustrate the inclusion of sustainability in HEIs' economics education programmes. The case study approach provides in-depth insights and strengthens analytical findings (Yin, 2018), efficiently gathering extensive data from various sources, generating fresh, contextualised insight (Eisenhardt and Graebner, 2007; Miles *et al.*, 2019; Yin, 2018). Recommended by authors such as Adams *et al.* (2016) and Brophy and Bawden (2005), the case studies were chosen through searches in WoS and Google. Firstly, peer-reviewed publications in the WoS database were searched for sustainability in economic degrees. Subsequently, Google was used to identify universities offering economic degrees with a sustainability focus. In the second phase, data from 28 case studies were tabulated, including details such as university, country, programme, scope and source. In the next step, economics degrees for cases 1 to 16 (WoS) and cases 17 to 28 (Google) were scrutinised, resulting in a database of 285 potential degree programmes (112 undergraduate, 173 graduate). Focused on economics to address a literature gap, business, finance, marketing and other degrees were excluded, leaving 64 degrees for analysis (34 undergraduate, 30 graduate). Sustainability information was sought on the 64 main websites and programme details, using titles, descriptions and content. Missing data were requested via email to complete the analysis database for each degree.

Figure 4 summarises the research methodology steps.

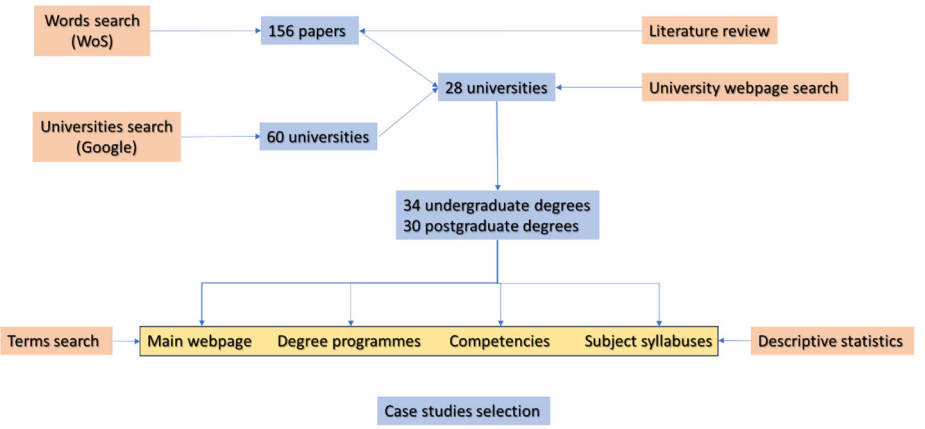


Figure 4.
Methodological process followed in this research to assess the approach to sustainability in economics degree programmes

Source: Author's own work

4. Results and discussion

Articles from WoS-indexed peer-reviewed journals were published in the last decade, the oldest in 2013. All, except Novo-Corti *et al.* (2018), rely on qualitative data relating case studies or interviews. Green (2013) and Novo-Corti *et al.* (2018) gathered data from students. Both studies find that introducing sustainability in economics degrees has a long way to go. Novo-Corti *et al.* (2018) find that while public universities are more active in SD initiatives, both public and private institutions need significant efforts to truly address sustainability.

The analysis of 16 universities in WoS-indexed publications is presented in Table 1. Some literature referenced universities in unspecified countries (Winter *et al.*, 2022). Others focused on specific subjects (Arnold, 2022; Gálvez-Rodríguez *et al.*, 2017). Some explored sustainability perceptions among economics students (Aikowe and Mazancova, 2023; Buchtele and Lapka, 2022; Delgado *et al.*, 2020; Gallardo-Milanés *et al.*, 2018), not considered for this study. This resulted in 28 university case studies outlined in the methods section, identified through combined searches on WoS (Figure 3) and Google. Table 2 presents results from the Google search on university Webpages. Economics degrees of the selected 28 cases presented in Table 1 (WoS) and Table 2 (Google), are discussed.

Table 1 details steps toward sustainability in HEIs' economic education programs. Measuring students' sustainability competence remains a challenge, identified as a future research need (Sandoval *et al.*, 2017), aligning with Figueiró and Raufflet (2015) study highlighting the lack of articles assessing sustainability's progress in management education and learning outcomes. As Molera *et al.* (2021), emphasise, implementing the advocated educational paradigm shift requires the commitment of all teachers. Stough *et al.* (2021) reveal that programmes focusing on sustainability topics can positively influence sustainability integration in other programmes through cross-pollination. Griffith and Moore (2020) compare teaching approaches in economics and sociology, highlighting innovative strategies like the flipped classroom in a Jamaican university to engage students and integrate sustainability into the curriculum, linking units to the SDGs.

Table 2 shows Google search findings on university Webpages. Sustainability studies are predominantly at the graduate level (7 out of 12 cases). While most programmes cover sustainability broadly, each programme's focus varies, contributing to different areas related to the 17 SDGs.

Figure 5 emphasises SDGs importance in economic studies. Undergraduate programmes mainly address SDG10 - 4 studies and SDG7 - 3 studies. Graduate studies equally tackle issues related to SDG7, SDG8 and SDG13.

Table 3 lists 34 undergraduate and 30 graduate economic degrees from selected universities, sourced from WoS and Google searches. It outlines if sustainability is mentioned in the degree description, title and syllabus, as well as its integration into student competencies, where applicable.

Despite selecting universities with a sustainability focus based on literature review (WoS) and Google search, only 23 out of 64 degrees include sustainability in their general descriptions. Sustainability is present in 92 undergraduate and 87 postgraduate courses, with detailed syllabuses available in specific degrees. Detailed information about course content is found in less than one-sixth (9 out of 64) of the analysed degrees. Sustainability is included in only two undergraduate degrees. Most universities do not display sustainability competences on their websites. Interestingly, sustainability courses are concentrated in six countries, out of 15 across three continents (Figure 6). Romania offers the most courses (40), followed by Canada (27), the USA (21), New Zealand and Italy (15 each) and Spain (14).

The above information has to be considered with caution, as the number of degrees analysed in each university is very different, varying from 29 in Romania, to only 1 each in

Table 1.
University case studies selected based on the WoS search

Case study	Programme and scope	Characterisation and implications	Reference
The University of British Columbia (Canada) Simon Fraser University (Canada) The University of Victoria (Canada) – Gustavson School of business	Signatories of the Talloires. Declaration commits to promoting sustainability and integrating it across curricula, particularly in introductory economic courses. The declaration and signatories can be viewed on the Association of University Leaders for a Sustainable Future website (ULSF, 2023)	Qualitative study with 54 student interviews on recent introductory economics courses at one of three universities reveals that the curriculum undermines sustainability commitments	Green (2013)
Universidad de Chile	The University of Chile, aligned with the Talloires Declaration, engages in the "EcoFEN for a Sustainable Campus" initiative (FEN, 2015). This includes integrating social responsibility into undergraduate curricula, promoting sustainable classrooms, using case studies for sustainability, offering sustainability courses and providing social internships. The Economics program emphasises ethical practice, transparency and economic and social well-being	EcoFEN's qualitative study (2007–2015) at the University of Chile's School of Economics explores sustainability. It advocates integrating sustainability into the curriculum, altering institutional consumption practices and promoting activities with the university community and sustainable entrepreneurs. A future challenge is establishing a permanent sustainability research line	Sandoval *et al.* (2017) FEN UCHILE (2023)
Bucharest University of Economic Studies, "Constantin Brancusi" University from Targu-Jiu, Bucharest University, Politehnica University of Bucharest, Hyperion University, Cantemir University and University from Craiova, Alexandru Ioan Cuza University and Stefan cel Mare University from Suceava (Romania)	Romania's economic HEIs are gradually adapting to environmental requirements through programs, projects and debates on SD	Quantitative study with 1,250 respondents (students, master's and PhD) from Romanian economic faculties. *t*-test and ANOVA identified differences. All programs require attitude and mentality changes. Public universities in Romania are more engaged in SD initiatives, with positive student reactions	Novo-Corti *et al.* (2018)
University of the West Indies (Jamaica)	Economic planning equips students for organisational, regional or macroeconomic planning, covering SDGs in various topics throughout the course	A case study comparing economics and sociology shows the need to integrate sustainability and SDGs into course delivery	Griffith and Moore (2020)
University of Murcia (Spain)	The University of Murcia's Faculty of Economics and Business conducted a pilot project to implement Curricular Sustainability in the Economics Degree	Qualitative study on a pilot project for teaching innovation aimed at integrating sustainability into the Economics degree. It produced a Sustainability Competency Map and learning resources to guide the inclusion of sustainability content in teaching practices	Molera *et al.* (2021)
KU Leuven Faculty of Economics and Business (FEB) (Belgium)	Bachelor in Economics, Master of Business Economics, Master in Economic Policy and Master of Economics from Leuven. The university integrates Ethics, Responsibility and Sustainability (ERS) into the business faculty curricula	Belgian university case study reveals a "broad, horizontal" approach effectively integrates sustainability into business/economics courses. This approach aids internal strategy by identifying high and low integration levels and understanding the impact of variables like instructor characteristics	Stough *et al.* (2021)

Source: Author's own work

Case study	Programme and scope	Characterisation and implications	Reference
Barcelona School of Economics (Spain)	Specialised Master's in Energy Economics and Sustainability provides advanced insights into the evolving energy sector. Explore economic theory and data tools to grasp its dynamics and trends.	1 Graduate level 7 subjects SDGs 7, 13 	BSE (2023)
Università Degli Studi Dell 'Insubria (Italy)	Economics and Innovation Sustainability degree imparts skills to analyse enterprise functioning, emphasizing innovation and sustainability.	1 Undergraduate level 6 subjects SDGs 3, 7, 8, 10 	UNINSUBRIA (2023)
University of Technology Sydney (Australia)	Economics and Sustainability degrees provide analytical skills for economic principles and multidisciplinary knowledge for the green economy	2 Undergraduate level 5 subjects SDGs 10, 11, 13 	UTS (2023)
Norwegian University of Life Sciences (Norway)	Master's in Applied Economics and Sustainability covers micro and macroeconomic theory, empirical methods, and public	1 Graduate level 8 subjects	NMBU (2023)
	economics with a focus on sustainability.	SDGs 1, 10, 12, 13 	
Northumbria University (Newcastle, United Kingdom)	The Master in Economics and Sustainability offers advanced training in sustainability economics and policies, along with a solid foundation in environmental and resource economics.	1 Graduate level 3 subjects SDGs 12, 13 	Northumbria (2023)
The Ohio State University	The Environment, Economy, Development, and Sustainability major is a multidisciplinary program focusing on economic, business, and social aspects of sustainability. It equips students with essential knowledge and skills for careers in sustainability across various sector.	1 undergraduate level 19 subjects SDGs 2, 7, 10, 11, 12 	OSU (2023)
Torrens University Australia	The Master of Economics of Sustainability enhances skills for a career in sustainability economics, covering advanced concepts in ecological economics, modern monetary theory, and financial systems while fostering critical thinking and problem-solving.	1 Graduate level 4 subjects SDGs 7, 8 	Torrens (2023)

(*continued*)

Table 2.
University case studies selected based on the Google search

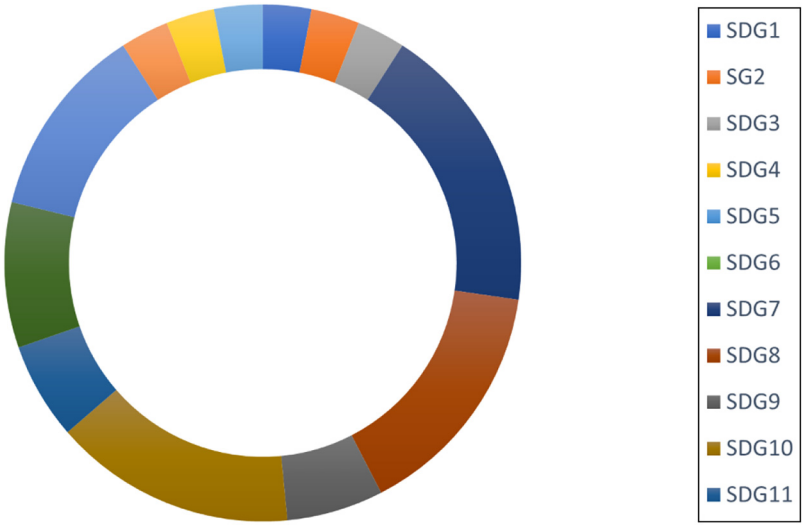
Ca' Foscari University of Venice (Italy)	Masters in Economics, Finance, and Sustainability integrates climate change's impact on sustainable development, merging finance and sustainability. Students learn to assess, understand, and manage sustainable development dimensions, considering risks and opportunities for institutions and the economic system.	1 Graduate level 8 subjects SDGs 7, 14 	UNIVE.IT (2023)
Universität Oldenburg (Germany)	Sustainable Economics bachelor's program addresses economic causes and solutions for transforming towards a responsible, sustainable society.	1 Undergraduate level 6 subjects SDGs 7, 10 	UOL (2023)
Wageningen University & Research (The Netherlands)	Master's in Economics of Sustainability emphasizes economic interactions with the environment. Students learn quantitative techniques and theories at micro, behavioural, and institutional levels.	1 Graduate level 5 subjects SDGs 8, 9, 17 	WUR (2023)
Massey University (New Zealand)	The Master in Sustainable Development Goals (Economics for Sustainability) emphasizes UN SDG theory and practice, addressing the critical imperative of sustainability.	1 Graduate level 5 subjects SDGs 8, 9 	Massey (2023)
Universidad Autónoma de Nuevo León (Mexico)	Economics degree aims to produce graduates with a holistic perspective, dedication to social welfare, and global competence. Equipped with deductive analytical reasoning and critical thinking, they can address economic and social challenges at regional, national, and international levels.	1 Undergraduate level 3 subjects SDGs 8, 16 	UANL (2023)

Table 2.

Source: Author's own work

Norway, the UK, the Netherlands and Mexico. Moreover, when the intensity, i.e. proportion of sustainability courses by degree in each country, translated into average values in Figure 7, of the sustainability courses in the studies is observed, the picture changes, and the countries with the highest number of courses by degree are the USA (21), New Zealand (15), Norway (8), Italy (7.5) Germany (6), the Netherlands (5) and Spain (4.67). All other countries show a symbolic presence of sustainability courses.

The critical nature of the situation is evident in this analysis, which focuses on 15 degrees related to sustainability, 10 bachelor's and 5 Master's. Official websites of the analysed degree programmes lack any mention of sustainability in their "letter of introduction". Information on competencies is sparse, hindering the influence on future economists and the promotion of global societal change. In Jamaican undergraduate studies, sustainability is only offered optionally, and 3 out of 16 Romanian degrees



Source: Author's own work

Figure 5.
Importance of the SDGs in economic studies

include sustainability as an elective. The same pattern is observed in Jamaican Master's degrees and three analysed Romanian degrees.

5. Conclusions

The significance of education, particularly in universities, for achieving the UN SDGs is widely acknowledged. Education (SDG4) is a specific goal and also a target in several other SDGs. The study aimed to explore sustainability concepts in economics degree programmes within HEIs. The study's conceptual theoretical framework involved a two-phase literature review and bibliometric analysis using the WoS database, focusing on sustainability, economics, education/training and universities. Google was then used to identify universities offering sustainability in economic degree programmes. 28 relevant university case studies were collected to investigate sustainability in HEIs economics degree programmes. Analysing various university case studies beyond initial WoS and Google searches reveals that sustainability content is predominantly integrated at the undergraduate level. Teaching programme focuses vary, addressing issues like reducing inequalities through economic decisions and promoting affordable and clean energy. Postgraduate studies delve into a more intricate mix of topics, including affordable and clean energy, decent work and economic development and responsible consumption and production. These findings indicate progress in infusing sustainability concepts into economics education, but additional efforts are necessary for a comprehensive understanding of sustainability objectives. Addressing these challenges may involve curriculum changes. Integrating sustainability into economics programmes must tackle operational issues, such as busy schedules and full timetables. Some cases may require additional training and resources for teaching staff to effectively incorporate sustainability. This, in turn, can foster stronger changes in the attitudes and competencies of economics degree students towards sustainability.

This study, limited by the focus on economics-related programmes in the literature review from WoS, excludes examples from various developing countries among the 28

Table 3.
Information on the integration of sustainability in the analysed university case studies

University	Undergraduate studies	*n*	G	S	C	Graduate studies	*n*	G	S	C
University of British Columbia, Canada	1. International Economics	5	Y	N	N					
	2. Economics (BA)	2	Y	N	N					
	3. Economics (BSc)	–	Y	N	N					
	4. Food and Resource Economics	12	Y	Y	N					
	5. International Economics	4	Y	Y	N					
	6. Mathematics and Economics	–	N	N	N					
	7. Philosophy, Politics and Economics	1	Y	Y	N					
Simon Fraser University, Canada	8.Economics	2	Y	N	N	1. Economics	1	N	Y	N
	9. Political Science and Economics Joint Major	–	Y	N	N					
University of Chile, Chile						2.Applied Economics	1	N	N	N
						3. Economic Analysis	2	N	N	N
						4. Economics	1	N	N	N
Bucharest University of Economic Studies, Romania	10. Agri food and Environmental Economics	13	Y	N	Y	5. Economics and Administration of Agri-food Business	1	N	N	N
	11.Economic Cybernetics	1	N	N	N	6. Ecological Economics	10	N	N	N
	12. International Business and Economics	1	N	N	N	7. Cybernetics and Quantitative Economics	–	N	N	N
	13. Economics and Economic Communication in Business	–	N	N	N	8. Economic Informatics	–	N	N	N
	14. International Business and Economics	1	N	N	N	9. Sustainable development of business and economic organizations	11	N	N	N
						10. European Economics	–	N	N	N
						11. Economics Didactic	–	N	N	N
						12. Diplomacy International Economy	–	N	N	N
						13. International Economics and European Affairs	–	N	N	N
Constantin Brancusi University from Targu-Jiu, Romania	15. Trade, Tourism and Service Economy	–	N	N	N					
	16. Economic informatics	–	N	N	N					
University of Bucharest, Romania	17. Cybernetics, Statistics and Economic Informatics	–	N	N	N	14. Behavioural Economics	–	N	N	N

(*continued*)

Table 3.

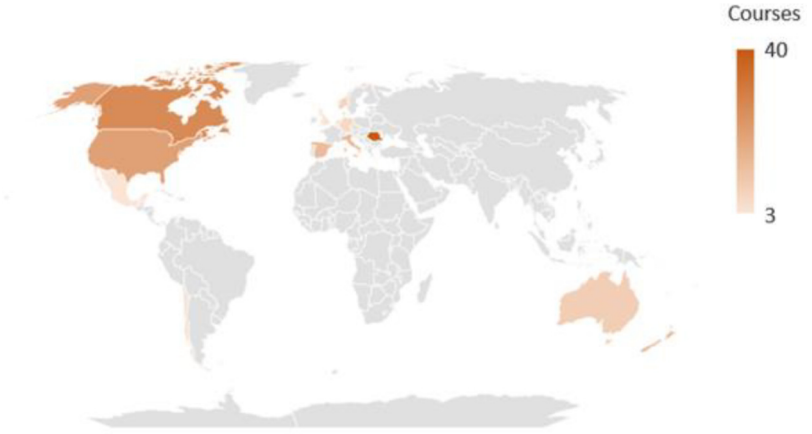
University	Undergraduate studies	*n*	G	S	C	Graduate studies	*n*	G	S	C
Hyperion University, Romania	18. Economics of Trade, Tourism and Service	–	N	N	N					
Dimitrie Cantemir University, Romania	19. Service and Tourism Commerce Economy	–	N	N	N					
Alexandru Ion Cuza University, Romania	21. Cybernetics, Statistics and Economic Informatics	–	N	N	N	15. Economic Informatics	–	N	N	N
	22. Economics and International Affairs	–	N	N	N	16. Economics	–	N	N	N
						17. Economics and International Affairs	–	N	N	N
Stefan Cel Mare University, Romania	23. Trade, Tourism and Service Economy	2	Y	N	N					
	24. Economic Informatics	–	N	N	N					
	25. General Economics and Economic Communication	–	N	N	N					
University of the West Indies, Jamaica	26. Economics	1	Y	N	N	18.Economics	–	N	N	N
						19. International Economics and International Law	–	N	N	N
						20. Development Studies	3	N	Y	N
University of Murcia, Spain	27. Economics	4	N	Y	N	21. Economic Development and International Cooperation	3	Y	N	N
KU Leuven University, Belgium	28. Economics	3	Y	N	N	22. Economic Policy	–	N	N	N
						23. Economics	3	N	Y	N
Barcelona School of Economics, Spain						24. The Economics of Energy, Climate Change and Sustainability	7	Y	N	N
University Degli Study Dell'Insubria, Italy	29. Economics and management of innovation and sustainability	6	Y	N	N					
University of Technology Sydney, Australia	30. Economics	1	N	Y	N					
	31. Sustainability and Environment/ Economics	4	Y	Y	N					

(*continued*)

Table 3.

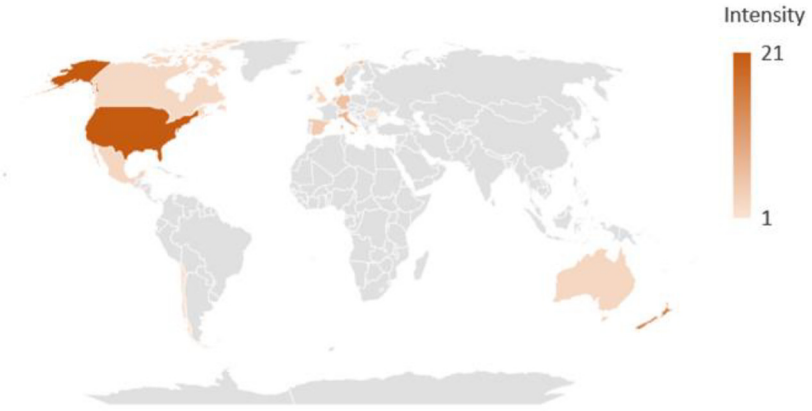
University	Undergraduate studies	*n*	G	S	C	Graduate studies	*n*	G	S	C
Norwegian University of Life Sciences, Norway						25. Applied Economics and Sustainability	8	Y	N	N
Northumbria University, UK						26 Economics and Sustainability	3	Y	N	N
The Ohio State University, USA	32. Environment, Economy, Development and Sustainability	21	Y	N	N					
Torrens University, Australia						27. Economics and Sustainability	4	Y	N	N
Ca' Foscari University of Venice, Italy						28. Economics, Finance and Sustainability	9	Y	N	N
Universität Oldenburg, Germany	33. Sustainable Economics	6	Y	N	N					
Wageningen University and Research, Netherlands						29. Economics of Sustainability	5	Y	N	N
Massey University, New Zealand						30. SDGs	15	Y	N	N
Universidad Autónoma de Nuevo León, Mexico	34. Economics	3	Y	N	Y					
	Undergraduate sustainability subjects	92				Graduate sustainability subjects	87			

Notes: *n* = number of subjects that include sustainability; G = if sustainability is included it in the general description of the degrees; S = if the syllabus of the subject were available; C = if the competencies integrate sustainability; Y = yes; N = no
Source: Author's own work



Source: Author's own work

Figure 6.
Sustainability being addressed in economics courses, by country



Source: Author's own work

Figure 7.
Intensity in sustainability being addressed in economics courses, by country

selected university case studies. It provides insights into current sustainability trends in economics degrees but does not offer a comprehensive global representation. However, this study identifies a knowledge gap in understanding how sustainability concepts are integrated into economics degree programmes in HEIs. It emphasises the need to explore pedagogical approaches for incorporating SDGs into economics curricula and assess the impact on students' competencies and attitudes towards sustainability. The study also highlights a lack of knowledge about challenges and barriers to implementing SDGs in economics programmes globally. Thus, and despite limitations, the research contributes to bridging this gap by linking theory to practice, expanding the analysis and drawing attention to specific characteristics that should be included in economics education programmes for sustainability, providing students with valuable opportunities and societal implications. Further research is needed to evaluate pedagogical approaches integrating

SDGs into economics curricula. Additionally, there is a need to understand students' awareness of sustainability issues and how their behaviour and professional practices may change due to sustainability knowledge. Internationally, exploring challenges in implementing SDGs in economics degree programmes worldwide can contribute to developing sustainable economic education in HEIs.

References

Adams, J., Hillier-Brown, F.C., Moore, H.J., Lake, A.A., Araujo-Soares, V., White, M. and Summerbell, C. (2016), "Searching and synthesising' grey literature' and 'grey information' in public health: critical reflections on three case studies", *Systematic Reviews*, Vol. 5 No. 1, p. 164, doi: 10.1186/s13643-016-0337-y.

Aikowe, L.D. and Mazancova, J. (2023), "Pro-environmental awareness of university students – assessment through sustainability literacy test", *International Journal of Sustainability in Higher Education*, Vol. 24 No. 3, pp. 719-741, doi: 10.1108/ijshe-06-2021-0219.

Albareda-Tiana, S., Ruíz-Morales, J., Azcárate, P., Valderrama-Hernández, R. and Múñoz, J.M. (2020), "The EDINSOST project: implementing the sustainable development goals at university level", in Leal Filho, W., Salvia, A.L., Pretorius, R.W., Brandli, L.L., Manolas, E., Alves, F., Azeiteiro, U., Rogers, J., Shiel, C. and Paço, A.d. (Eds), *Universities as Living Labs for Sustainable Development*, pp. 193-210.

Albert, M. and Uhlig, M. (2021), "Education for sustainable development at Chemnitz university of technology", *International Journal of Sustainability in Higher Education*, Vol. 23 No. 6, pp. 1229-1249, doi: 10.1108/ijshe-02-2021-0078.

Alcántara-Rubio, L., Valderrama-Hernández, R., Solís-Espallargas, C. and Ruiz-Morales, J. (2022), "The implementation of the SDGs in universities: a systematic review", *Environmental Education Research*, Vol. 28 No. 11, pp. 1585-1615, doi: 10.1080/13504622.2022.2063798.

Alexa (2023), "Alexa search engine ranking", available at: https://web.archive.org/web/20160305234311/http://www.alexa.com/siteinfo/google.com+yahoo.com+altavista.com

Alliance Copernicus (2011), "COPERNICUS Charta 2.0/2011 – European commitment to higher education for sustainable development", available at: www.copernicus-alliance.org/images/Downloads/COPERNICUSCharta_2.0.pdf

Alm, K., Beery, T.H., Eiblmeier, D. and Fahmy, T. (2022), "Students' learning sustainability – implicit, explicit or non-existent: a case study approach on students' key competencies addressing the SDGs in HEI program", *International Journal of Sustainability in Higher Education*, Vol. 23 No. 8, pp. 60-84, doi: 10.1108/ijshe-12-2020-0484.

Álvarez, I., Etxeberria, P., Alberdi, E., Pérez-Acebo, H., Eguia, I. and García, M.J. (2021), "Sustainable civil engineering: incorporating sustainable development goals in higher education curricula", *Sustainability*, Vol. 13 No. 16, doi: 10.3390/su13168967.

Arnold, M.G. (2022), "Sustainability service learning in economics", *Journal of International Education in Business*, Vol. 15 No. 1, pp. 106-125, doi: 10.1108/jieb-03-2021-0040.

Baena-Morales, S., García-Taibo, O., Merma-Molina, G. and Ferriz-Valero, A. (2022), "Analysing the sustainability competencies of preservice teachers in Spain", *Journal of Applied Research in Higher Education*, Vol. 15 No. 3, pp. 731-744, doi: 10.1108/jarhe-02-2022-0040.

Beagon, U., Kövesi, K., Tabas, B., Nørgaard, B., Lehtinen, R., Bowe, B., ... Spliid, C.M. (2022), "Preparing engineering students for the challenges of the SDGs: what competences are required?", *European Journal of Engineering Education*, Vol. 48 No. 1, pp. 1-23, doi: 10.1080/03043797.2022.2033955.

Brake, D.R. (2017), "The invisible hand of the unaccountable algorithm: how Google, Facebook and other tech companies are changing journalism", in Tong, J. and Lo, S.-H. (Eds), *Digital Technology and Journalism*, Springer International Publishing.

Brophy, J. and Bawden, D. (2005), "Is Google enough? Comparison of an internet search engine with academic library resources", *Aslib Proceedings*, Vol. 57 No. 6, pp. 498-512, doi: 10.1108/00012530510634235.

Brundtland, G.H. (1987), "Our common future (a/42/427)", New York, available at: https://sustainabledevelopment.un.org/content/documents/5987our-common-future.pdf

BSE (2023), "Barcelona school of economics", available at: https://bse.eu/study/masters-programs/economics-energy-climate-change-sustainability

Buchtele, R. and Lapka, M. (2022), "The usual discourse of sustainable development and its impact on students of economics: a case from Czech higher education context", *International Journal of Sustainability in Higher Education*, Vol. 23 No. 5, pp. 1001-1018, doi: 10.1108/ijshe-02-2021-0067.

Carrió Llach, M. and Llerena Bastida, M. (2023), "Exploring innovative strategies in problem based learning to contribute to sustainable development: a case study", *International Journal of Sustainability in Higher Education*, Vol. 24 No. 9, pp. 159-177, doi: 10.1108/ijshe-07-2021-0296.

Costanza, R. and Daly, H.E. (1987), "Toward an ecological economics", *Ecological Modelling*, Vol. 38 Nos 1/2, pp. 1-7, doi: 10.1016/0304-3800(87)90041-x.

Crutzen, P.J. and Stoermer, E.F. (2017), "The 'Anthropocene' (2000)", *The Future of Nature*, Vol. 41, pp. 479-490.

Dasgupta, P. (2021), "The economics of biodiversity: the Dasgupta review", Full Report. Updated: 18 February 2021, available at: www.gov.uk/government/publications/final-report-the-economics-of-biodiversity-the-dasgupta-review

Davelaar, D. (2021), "Transformation for sustainability: a deep leverage points approach", *Sustainability Science*, Vol. 16 No. 3, pp. 727-747, doi: 10.1007/s11625-020-00872-0.

Delgado, C., Venkatesh, M., Castelo Branco, M. and Silva, T. (2020), "Ethics, responsibility and sustainability orientation among economics and management masters' students", *International Journal of Sustainability in Higher Education*, Vol. 21 No. 2, pp. 181-199, doi: 10.1108/ijshe-02-2019-0058.

Eisenhardt, K.M. and Graebner, M.E. (2007), "Theory building from cases: opportunities and challenges", *Academy of Management Journal*, Vol. 50 No. 1, pp. 25-32, doi: 10.5465/amj.2007.24160888.

Fauzi, M.A., Abdul Rahman, A.R. and Lee, C.K. (2022), "A systematic bibliometric review of the united nation's SDGS: which are the most related to higher education institutions?", *International Journal of Sustainability in Higher Education*, Vol. 24 No. 3, pp. 637-659, doi: 10.1108/ijshe-12-2021-0520.

Fekih Zguir, M., Dubis, S. and Koç, M. (2021), "Embedding education for sustainable development (ESD) and SDGs values in curriculum: a comparative review on Qatar, Singapore and New Zealand", *Journal of Cleaner Production*, Vol. 319, doi: 10.1016/j.jclepro.2021.128534.

FEN UCHILE (2023), "Facultad de economía y negocios", Universidad de Chile, available at: https://fen.uchile.cl/es

FEN (2015), "Orientador de competencias genéricas: Facultad de economía y negocios", Universidad de Chile.

Ferrer-Estévez, M. and Chalmeta, R. (2021), "Integrating sustainable development goals in educational institutions", *The International Journal of Management Education*, Vol. 19 No. 2, doi: 10.1016/j.ijme.2021.100494.

Fia, M., Ghasemzadeh, K. and Paletta, A. (2022), "How higher education institutions walk their talk on the 2030 agenda: a systematic literature review", *Higher Education Policy*, Vol. 36 No. 3, pp. 1-34, doi: 10.1057/s41307-022-00277-x.

Figueiró, P.S. and Raufflet, E. (2015), "Sustainability in higher education: a systematic review with focus on management education", *Journal of Cleaner Production*, Vol. 106 No. 1, pp. 22-33, doi: 10.1016/j.jclepro.2015.04.118.

Folke, C., Polasky, S., Rockstrom, J., Galaz, V., Westley, F., Lamont, M., ... Walker, B.H. (2021), "Our future in the Anthropocene biosphere", *Ambio*, Vol. 50 No. 4, pp. 834-869, doi: 10.1007/s13280-021-01544-8.

Gallardo-Milanés, O.A., Olivera-Pátaro, C.S. and Mezzomo, F.A. (2018), "Los estudiantes universitarios de UNESPAR- Brasil y el desarrollo sostenible", *Revista Educación*, pp. 328-344, doi: 10.15517/revedu.v43i1.29025.

Gálvez-Rodríguez, M.D.M., García de Frutos, N., Antolin-Lopez, R. and Sáez-Martín, A. (2017), "Exploring the degree of integration of sustainability in business curricula at the university of Almeria: an students' perception", *Paper presented at the EDULEARN17 Proceedings*.

García-Feijoo, M., Eizaguirre, A. and Rica-Aspiunza, A. (2020), "Systematic review of sustainable-development-goal deployment in business schools", *Sustainability*, Vol. 12 No. 1, doi: 10.3390/su12010440.

Green, T.L. (2013), "Teaching (un)sustainability? University sustainability commitments and student experiences of introductory economics", *Ecological Economics*, Vol. 94, pp. 135-142, doi: 10.1016/j.ecolecon.2013.08.003.

Greer, J. and Bruno, K. (1996), *Greenwash: The Reality behind Corporate Environmentalism*, Third World Network.

Griffith, A. and Moore, W. (2020), "A comparative analysis of approaches to integrating sustainability into the curriculum at a university in a small island developing state in the Caribbean", in Sengupta, E., Blessinger, P. and Yamin, T.S. (Eds), *Integrating Sustainable Development into the Curriculum*, pp. 41-56.

Gui, X., Gou, Z. and Lu, Y. (2021), "Reducing university energy use beyond energy retrofitting: the academic calendar impacts", *Energy and Buildings*, Vol. 231, doi: 10.1016/j.enbuild.2020.110647.

Holden, E., Linnerud, K. and Banister, D. (2017), "The imperatives of sustainable development", *Sustainable Development*, Vol. 25 No. 3, pp. 213-226, doi: 10.1002/sd.1647.

Hübscher, C., Hensel-Börner, S. and Henseler, J. (2022), "Social marketing and higher education: partnering to achieve sustainable development goals", *Journal of Social Marketing*, Vol. 12 No. 1, pp. 76-104, doi: 10.1108/jsocm-10-2020-0214.

International Association of Universities (IAU) (2023), "Higher education and research for sustainable development (HESD)", available at: www.iau-hesd.net/

International Society for Ecological Economics (2023), "Welcome to the international society for ecological economics", available at: www.isecoeco.org

IPCC (1988), "History of the IPCC", available at: www.ipcc.ch/about/history/

Kanapathy, S., Lee, K.E., Mokhtar, M., Syed Zakaria, S.Z. and Sivapalan, S. (2021), "A framework for integrating sustainable development concepts into the chemistry curriculum towards achieving education for sustainable development in Malaysia", *International Journal of Sustainability in Higher Education*, Vol. 22 No. 6, pp. 1421-1449, doi: 10.1108/ijshe-07-2020-0241.

Kioupi, V. and Voulvoulis, N. (2020), "Sustainable development goals (SDGs): assessing the contribution of higher education programmes", *Sustainability*, Vol. 12 No. 17, doi: 10.3390/su12176701.

Leal Filho, W., Shiel, C., Paço, A., Mifsud, M., Ávila, L.V., Brandli, L.L., ... Caeiro, S. (2019), "Sustainable development goals and sustainability teaching at universities: falling behind or getting ahead of the pack?", *Journal of Cleaner Production*, Vol. 232, pp. 285-294, doi: 10.1016/j.jclepro.2019.05.309.

Leal Filho, W., Sima, M., Sharifi, A., Luetz, J.M., Salvia, A.L., Mifsud, M., ... Lokupitiya, E. (2021a), "Handling climate change education at universities: an overview", *Environmental Sciences Europe*, Vol. 33 No. 1, p. 19, doi: 10.1186/s12302-021-00552-5.

Leal Filho, W., Frankenberger, F., Salvia, A.L., Azeiteiro, U., Alves, F., Castro, P., ... Ávila, L.V. (2021b), "A framework for the implementation of the sustainable development goals in university programmes", *Journal of Cleaner Production*, Vol. 299, doi: 10.1016/j.jclepro.2021.126915.

Leal Filho, W., Dinis, M.A.P., Ruiz-de-Maya, S., Doni, F., Eustachio, J.H., Swart, J. and Paço, A. (2022a), "The economics of the UN sustainable development goals: does sustainability make financial sense?", *Discover Sustainability*, Vol. 3 No. 1, pp. 1-8, doi: 10.1007/s43621-022-00088-5.

Leal Filho, W., Kovaleva, M., Tsani, S., Țîrcă, D.-M., Shiel, C., Dinis, M.A.P., ... Tripathi, S. (2022b), "Promoting gender equality across the sustainable development goals", *Environment, Development and Sustainability*, Vol. 25 No. 12, pp. 1-22, doi: 10.1007/s10668-022-02656-1.

Leal Filho, W., Salvia, A.L., Vasconcelos, C.R.P., Anholon, R., Rampasso, I.S., Eustachio, J.H.P.P., ... Sharifi, A. (2022c), "Barriers to institutional social sustainability", *Sustainability Science*, Vol. 17 No. 6, pp. 2615-2630, doi: 10.1007/s11625-022-01204-0.

Leal Filho, W., Vasconcelos, C.R.P., Dinis, M.A.P. and Trevisan, L.V. (2022d), "Commentary - empty promises: why declarations and international cooperation on sustainable development often fail to deliver", *International Journal of Sustainable Development and World Ecology*, Vol. 29 No. 8, pp. 850-857, doi: 10.1080/13504509.2022.2107108.

Leal Filho, W., Vidal, D.G., Chen, C., Petrova, M., Dinis, M.A.P., Yang, P., ... Neiva, S. (2022e), "An assessment of requirements in investments, new technologies and infrastructures to achieve the SDGs", *Environmental Sciences Europe*, Vol. 34 No. 1, pp. 1-17, doi: 10.1186/s12302-022-00629-9.

Leal Filho, W., Wall, T., Barbir, J., Alverio, G.N., Dinis, M.A.P. and Ramirez, J. (2022f), "Relevance of international partnerships in the implementation of the UN sustainable development goals", *Nature Communications*, Vol. 13 No. 1, doi: 10.1038/s41467-022-28230-x.

Leal Filho, W., Abubakar, I.R., Mifsud, M.C., Eustachio, J.H.P.P., Albrecht, C.F., Dinis, M.A.P., ... Dibbern, T.A. (2023a), "Governance in the implementation of the UN sustainable development goals in higher education: global trends", *Environment, Development and Sustainability*, doi: 10.1007/s10668-023-03278-x.

Leal Filho, W., Aina, Y., Dinis, M.A.P., Purcell, W. and Nagy, G.J. (2023b), "Climate change: Why higher education matters?", *Science of the Total Environment*, Vol. 892, doi: 10.1016/j.scitotenv.2023.164819.

Leal Filho, W., Brandli, L.L., Dinis, M.A.P., Vidal, D.G., Paço, A., Levesque, V., ... Pace, P. (2023c), "International trends on transformative learning for urban sustainability", *Discover Sustainability*, Vol. 4 No. 1, pp. 1-13, doi: 10.1007/s43621-023-00145-7.

Leal Filho, W., Dibbern, T., Trevisan, L.V., Cristofoletti, E.C., Dinis, M.A.P., Matandirotya, N., ... Sanni, M. (2023d), "Mapping universities-communities partnerships in the delivery of the sustainable development goals", *Frontiers in Environmental Science*, Vol. 11, pp. 1-12, doi: 10.3389/fenvs.2023.1246875.

Leal Filho, W., Salvia, A.L. and Eustachio, J.H.P.P. (2023e), "An overview of the engagement of higher education institutions in the implementation of the UN sustainable development goals", *Journal of Cleaner Production*, Vol. 386doi, doi: 10.1016/j.jclepro.2022.135694.

Leal Filho, W., Simaens, A., Paço, A., Hernandez-Diaz, P.M., Vasconcelos, C.R.P., Fritzen, B. and Mac-Lean, C. (2023f), "Integrating the sustainable development goals into the strategy of higher education institutions", *International Journal of Sustainable Development and World Ecology*, pp. 1-12, doi: 10.1080/13504509.2023.2167884.

Leal Filho, W., Trevisan, L.V., Rampasso, I.S., Anholon, R., Dinis, M.A.P., Brandli, L.L., ... Mazutti, J. (2023g), "When the alarm bells ring: why the UN sustainable development goals may not be achieved by 2030", *Journal of Cleaner Production*, Vol. 407, doi: 10.1016/j.jclepro.2023.137108.

Leal Filho, W., Vidal, D.G., Dinis, M.A.P., Lambrechts, W., Vasconcelos, C.R.P., Molthan-Hill, P., ... Sharifi, A. (2023h), "Low carbon futures: assessing the status of decarbonisation efforts at universities within a 2050 perspective", *Energy, Sustainability and Society*, Vol. 13 No. 1, doi: 10.1186/s13705-023-00384-6.

Lee, B., Liu, K., Warnock, T.S., Kim, M.O. and Skett, S. (2023), "Students leading students: a qualitative study exploring a student-led model for engagement with the sustainable development goals", *International Journal of Sustainability in Higher Education*, Vol. 24 No. 3, pp. 535-552, doi: 10.1108/ijshe-02-2022-0037.

Logan, K.G., Nelson, J.D., Osbeck, C., Chapman, J.D. and Hastings, A. (2020), "The application of travel demand management initiatives within a university setting", *Case Studies on Transport Policy*, Vol. 8 No. 4, pp. 1426-1439, doi: 10.1016/j.cstp.2020.10.007.

Lydenberg, S. (2014), "Ethics, politics, sustainability and the 21st century trustee", *Socially Responsible Investment in the 21st Century: Does It Make a Difference for Society?*, Emerald Group Publishing.

Massey (2023), "Massey university", available at: www.massey.ac.nz/study/all-qualifications-and-degrees/master-of-sustainable-development-goals-PMSSD/economics-for-sustainability-PMSSD1SECSS1/

Martínez Valdivia, E., Pegalajar Palomino, M.C. and Burgos-Garcia, A. (2023), "Active methodologies and curricular sustainability in teacher training", *International Journal of Sustainability in Higher Education*, Vol. 24 No. 6, doi: 10.1108/ijshe-05-2022-0168.

Martínez-Campillo, A. and Fernández-Gago, R. (2014), "The strategic nature of corporate social responsibility", *Journal of Globalization, Competitiveness, and Governability*, Vol. 2 No. 2, pp. 116-125, doi: 10.3232/gcg.2008.V2.N2.07.

Martins, F., Cezarino, L., Liboni, L., Hunter, T., Batalhao, A. and Paschoalotto, M.A.C. (2023), "Unlocking the potential of responsible management education through interdisciplinary approaches", *Sustainable Development*, doi: 10.1002/sd.2757.

Mezirow, J. (1997), "Transformative learning: theory to practice", *New Directions for Adult and Continuing Education*, Vol. 1997 No. 74, pp. 5-12, doi: 10.1002/ace.7401.

Miles, M.B., Huberman, A.M. and Saldana, J. (2019), *Qualitative Data Analysis. A Methods Sourcebook*, 4th ed., SAGE Publications, AZ State University, USA.

Millennium Ecosystem Assessment Board (2005a), "Ecosystem and human well-being – synthesis", available at: https://wedocs.unep.org/20.500.11822/8701

Millennium Ecosystem Assessment Board (2005b), "Living beyond our means. Natural assets and human well-being. Statement form the board", Washington, D.C, available at: www.wri.org/research/millennium-ecosystem-assessment-living-beyond-our-means

Millennium Ecosystem Assessment (2000), "Guide to the millennium assessment reports", available at: www.millenniumassessment.org/en/index.html

Molera, L., Sanchez-Alcazar, E.J., Faura-Martinez, U., Lafuente-Lechuga, M., Llinares-Ciscar, J.V., Marin-Rives, J.L., . . . Sanchez-Anton, M.C. (2021), "Embedding sustainability in the economics degree of the faculty of economics and business of the university of Murcia: a methodological approach", *Sustainability*, Vol. 13 No. 16, p. 8844, doi: 10.3390/su13168844. ARTN 8844.

NMBU ((2023), "Norwegian university of life sciences", available at: www.nmbu.no/en/studies/study-options/master/master-of-science-in-applied-economics-and-sustainability

Northumbria (2023), "Northumbria university", available at: www.northumbria.ac.uk/study-at-northumbria/courses/msc-economics-and-sustainability-dtfesy6/

Novo-Corti, I., Badea, L., Tirca, D.M. and Aceleanu, M.I. (2018), "A pilot study on education for sustainable development in the Romanian economic higher education", *International Journal of Sustainability in Higher Education*, Vol. 19 No. 4, pp. 817-838, doi: 10.1108/ijshe-05-2017-0057.

Nyerere, J., Kapfudzaruwa, F., Fadairo, O., Odingo, A., Manchisi, J. and Kudo, S. (2021), "Case study: Higher education and the education for sustainable development in Africa (ESDA) program", in Leal Filho, W., Pretorius, R. and de Sousa, L.O. (Eds), *Sustainable Development in Africa: Fostering Sustainability in One of the World's Most Promising Continents*, pp. 179-199.

OECD (2023), "Green growth and sustainable development", available at: www.oecd.org/greengrowth/

OSU (2023), "The Ohio state university", available at: http://undergrad.osu.edu/majors-and-academics/majors/detail/300

Persson, L., Carney Almroth, B.M., Collins, C.D., Cornell, S., de Wit, C.A., Diamond, M.L., . . . Hauschild, M.Z. (2022), "Outside the safe operating space of the planetary boundary for novel entities", *Environmental Science and Technology*, Vol. 56 No. 3, pp. 1510-1521, doi: 10.1021/acs.est.1c04158.

Polasky, S., Kling, C.L., Levin, S.A., Carpenter, S.R., Daily, G.C., Ehrlich, P.R., . . . Lubchenco, J. (2019), "Role of economics in analyzing the environment and sustainable development", *Proceedings of the National Academy of Sciences*, Vol. 116 No. 12, p. 5233, doi: 10.1073/pnas.1901616116.

Purvis, B., Mao, Y. and Robinson, D. (2019), "Three pillars of sustainability: in search of conceptual origins", *Sustainability Science*, Vol. 14 No. 3, pp. 681-695, doi: 10.1007/s11625-018-0627-5.

Rockstrom, J., Steffen, W., Noone, K., Persson, A., Chapin, F.S., 3rd, Lambin, E.F. and Foley, J.A. (2009), "A safe operating space for humanity", *Nature*, Vol. 461 No. 7263, pp. 472-475, doi: 10.1038/461472a.

Salvia, A.L., Leal Filho, W., Brandli, L.L. and Griebeler, J.S. (2019), "Assessing research trends related to sustainable development goals: local and global issues", *Journal of Cleaner Production*, Vol. 208, pp. 841-849, doi: 10.1016/j.jclepro.2018.09.242.

Sandoval, F., Hasbún, B. and García, F. (2017), "A comprehensive sustainability policy at the school of economics and business, Universidad de Chile", *Handbook of Theory and Practice of Sustainable Development in Higher Education*, pp. 353-367.

SDSN (2015), "Sustainable development solutions network", available at: www.unsdsn.org/

SDSN (2017), "Getting started with the SDGs in universities", available at: https://resources.unsdsn.org/getting-started-with-the-sdgs-in-universities

Serafini, P.G., Moura, J.M.D., Almeida, M.R.D. and Rezende, J.F.D.D (2022), "Sustainable development goals in higher education institutions: a systematic literature review", *Journal of Cleaner Production*, Vol. 370, doi: 10.1016/j.jclepro.2022.133473.

Shiel, C., Smith, N. and Cantarello, E. (2020), "Aligning campus strategy with the SDGs: an institutional case study", *Universities as Living Labs for Sustainable Development*, pp. 11-27.

Sigahi, T.F.A.C. and Sznelwar, L.I. (2023), "From isolated actions to systemic transformations: Exploring innovative initiatives on engineering education for sustainable development in Brazil", *Journal of Cleaner Production*, Vol. 384, doi: 10.1016/j.jclepro.2022.135659.

Stahel, W.R. (2016), "The circular economy", *Nature*, Vol. 531 No. 7595, pp. 435-438, doi: 10.1038/531435a.

Steffen, W., Richardson, K., Rockstrom, J., Cornell, S.E., Fetzer, I., Bennett, E.M., ... Sorlin, S. (2015), "Planetary boundaries: guiding human development on a changing planet", *Science*, Vol. 347 No. 6223, p. 1259855, doi: 10.1126/science.1259855.

Steffen, W., Sanderson, A., Tyson, P., Jäger, J., Matson, P., Moore, B., ... Wasson, R.J. (2005), *Global Change and the Earth System – A Planet under Pressure*, Springer Berlin, Heidelberg, Berlin; New York, NY.

Sterling, S. (2011), "Transformative learning and sustainability: sketching the conceptual ground", *Learning and Teaching in Higher Education*, Vol. 5, pp. 17-33, available at: http://dl.icdst.org/pdfs/files3/ce3bd9b5c8a4133cd2d81b507badbd85.pdf

Stockholm Resilience Centre (2023), "Planetary boundaries", available at: www.stockholmresilience.org/research/planetary-boundaries.html

Stough, T., Ceulemans, K. and Cappuyns, V. (2021), "Unlocking the potential of broad, horizontal curricular assessments for ethics, responsibility and sustainability in business and economics higher education", *Assessment and Evaluation in Higher Education*, Vol. 46 No. 2, pp. 297-311, doi: 10.1080/02602938.2020.1772718.

The Blue Economy (2023), "Reconciling ecology and economy at the service of the common good", available at: www.theblueeconomy.org/

Torrens (2023), "Torrens university Australia", available at: www.torrens.edu.au/courses/business/master-of-economics-of-sustainability

UANL (2023), "Universidad Autónoma de nuevo león", available at: www.uanl.mx/oferta/economia/

ULSF (2023), "Association of university leaders for a sustainable future", available at: http://ulsf.org/talloires-declaration/

UNCED (1992), "Agenda 21", available at: https://sustainabledevelopment.un.org/outcomedocuments/agenda21

UNDP (2020), *The Next Frontier: Human Development and the Anthropocene*, United Nations Development Programme, New York, NY.

UNEP (2017), "Green industrial policy: concept, policies, country experiences", available at: www.unep.org/resources/report/green-industrial-policy-concept-policies-country-experiences

UNESCO (2018), Issues and trends in education for sustainable development, available at: https://unesdoc.unesco.org/ark:/48223/pf0000261954

UNESCO (2005a), "UN decade of ESD", available at: https://en.unesco.org/themes/education-sustainable-development/what-is-esd/un-decade-of-esd

UNESCO (2005b), "United nations decade of education for sustainable development (2005-2014): international implementation scheme", available at: https://unesdoc.unesco.org/ark:/48223/pf0000148654

UNESCO (2017), Education for sustainable development goals: learning objectives, available at: https://unesdoc.unesco.org/ark:/48223/pf0000247444

United Nations (1992), "United nations conference on environment and development", Rio de Janeiro, Brazil, 3-14 June 1992, available at: www.un.org/en/conferences/environment/rio1992

United Nations (2000), "Millennium development goals", available at: www.un.org/millenniumgoals/

United Nations (2015a), "Highlights of the UN sustainable development summit", available at: www.un.org/sustainabledevelopment/blog/2015/09/highlights-of-the-un-sustainable-development-summit/

United Nations (2015b), Transforming our world: the 2030 agenda for sustainable development, available at: https://sdgs.un.org/2030agenda

United Nations (2023a), "The 17 goals", available at: https://sdgs.un.org/goals

United Nations (2023b), "Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all", available at: https://sdgs.un.org/goals/goal4

United Nations (2023c), "Higher education and research for sustainable development (HESD)", available at: https://sdgs.un.org/partnerships/higher-education-and-research-sustainable-development-hesd

UTS (2023), "University of technology Sydney", available at: www.uts.edu.au/study/find-a-course/bachelor-economics-bachelor-sustainability-and-environment

UNINSUBRIA (2023), "Università degli studi dell 'insubria", available at: www.uninsubria.eu/lauream/course/economics-and-management-innovation-and-sustainability

UNIVE.IT (2023), "Ca'foscari university of Venice", available at: https://apply.unive.it/courses/course/262-ma-economics-finance-and-sustainability

UOL (2023), "Universität Oldenburg", available at: https://uol.de/en/course-of-study/sustainability-economics-subject-bachelor-602

Vogel, A. and Breßler, J. (2022), "The implementation of sustainability at universities: a study based on sustainable development goals", *International Journal of Innovation and Sustainable Development*, Vol. 16 Nos 3/4, doi: 10.1504/ijisd.2022.123906.

Wackernagel, M. and Rees, W. (1996), *Our Ecological Footprint: Reducing Human Impact on the Earth*, New Society Publishers, Philadelphia, PA.

Weiss, M., Barth, M. and von Wehrden, H. (2021), "The patterns of curriculum change processes that embed sustainability in higher education institutions", *Sustainability Science*, Vol. 16 No. 5, pp. 1579-1593, doi: 10.1007/s11625-021-00984-1.

Winter, J., Zhai, J. and Cotton, D.R.E. (2022), "Teaching environmental sustainability in China: opportunities and challenges for business and economics faculty in higher education", *Environmental Education Research*, Vol. 28 No. 2, pp. 318-332, doi: 10.1080/13504622.2021.2012560.

WoS (2023), "Advanced search query builder", available at: https://webofscience.help.clarivate.com/Content/advanced-search.html

WUR (2023), "Wageningen university and research", available at: www.wur.nl/en/education-programmes/master/msc-programmes/economics-of-sustainability.htm

Yin, R.K. (2018), *Case Study Research and Applications. Design and Methods*, 6th ed., SAGE Publications.

Zanitt, J.F., Rampasso, I.S., Quelhas, O.L.G., Serafim, M.P., Leal Filho, W. and Anholon, R. (2022), "Analysis of sustainability insertion in materials selection courses of engineering undergraduate programmes", *International Journal of Sustainability in Higher Education*, Vol. 23 No. 5, pp. 1192-1207, doi: 10.1108/ijshe-04-2021-0134.

https://orcid.org/0000-0002-7571-6666https://orcid.org/0000-0003-2637-9920https://orcid.org/0000-0001-7487-8308About the authors

Professor Walter Leal Filho holds the Chairs of Climate Change Management at the Hamburg University of Applied Sciences (Germany) and Environment and Technology at Manchester Metropolitan University (UK). He directs the Research and Transfer Centre "Sustainability Development and Climate Change Management". His main research interests are in the fields of SD and CC, also including aspects of CC and health.

Maria Alzira Pimenta Dinis, Habilitation, PhD, MSc, is an Associate Professor at the Faculty of Science and Technology, University Fernando Pessoa, Porto, Portugal, graduated in Metallurgical Engineering and Master Science in Materials Engineering at the Faculty of Engineering, University of Porto, Portugal; PhD in Earth Sciences and Habilitation in Ecology and Environmental Health at the Faculty of Science and Technology, University Fernando Pessoa, Portugal; researcher at FPENAS, UFP Energy, Environment and Health Research Unit and Fernando Pessoa Research, Innovation and Development Institute (FP-I3ID) in environment-related topics; Experienced Author, Editor and Reviewer. She also has expertise in sustainability. Maria Alzira Pimenta Dinis is the corresponding author and can be contacted at: madinis@ufp.edu.pt

Maria F. Morales is a Lecturer in Macroeconomics at the department of Economic Analysis, University of Murcia, Spain. PhD in Economics at the Universitat Autonoma de Barcelona, Spain. Her main research interests include aspects of the consequences of economic growth and sustainability.

María Semitiel-García is a Lecturer in Economics at the department of Applied Economics, University of Murcia, Spain. She has done BA in Economics (University of Murcia, Spain), MA in Economics (University of Manchester, UK) and PhD in Economics (University of Sheffield, UK). Her main research interests refer to human sustainable development, environmental governance, social capital, socio-ecological systems and social learning from a multidisciplinary perspective.

Pedro Noguera-Méndez is a Lecturer in Economics at the Department of Applied Economics, University of Murcia (Spain). His research is centred on the subject of sustainable development and the governance of natural resources, with a particular focus on the significance of social capital, social networks and social learning. In general terms, his research adopts a holistic methodological approach rooted in the literature on socio-ecological systems, thereby emphasising the social aspect within the realm of developmental processes. His primary research areas presently encompass the following: the examination of how sustainability education is incorporated into economics curricula; and the study of governance mechanisms within marine protected areas.

Salvador Ruiz de Maya is Professor of Marketing at the University of Murcia (Spain). He is the Principal Investigator of the Consumer Behaviour research group and Author of more than 50 articles in journals such as *Journal of Service Research*, *Journal of Interactive Marketing*, *Journal of Business Ethics*, *Ecological Economics*, *Psychology and Marketing* or *Journal of Advertising*. His work has focused on the study of how consumers process information from communication activities and share that information in social contexts, but also on the response of consumers to corporate social responsibility actions and, lately, how education and transformation services influence the welfare of students and the most disadvantaged social groups.

María-del-Carmen Alarcón-del-Amo is an Associate Professor of Marketing at the Faculty of Economics and Business, University of Murcia, Spain. Her main research line is focused on consumer behaviour and in education and sustainability. Her research appears in highly-ranked academic journals, including *Higher Education*, *Internet Research*, *International Business Review*, *Current Issues in Tourism*, *European Management Journal* and *Global Business Review*. Due to her research work, she has received several awards: CajaMurcia research award, Junior AEDEMO (Spanish Association of Market Research, Marketing and Opinion) Award, two awards for best PhD dissertation and an award for the best research work in tourism within the XXII Convocatoria Fitur.

Nuria Esteban-Lloret, is an Associate Professor of Management at the Faculty of Economics and Business, University of Murcia, Spain. She has done BA in Business (University of Murcia), MA in Banking Economics (University of Murcia) and PhD Business and Management (University of Murcia). Her research areas focus on Human resource management, Entrepreneurship and Corporate social responsibility. She is a Research Member of the Corporate Social Responsibility Chair at the University of Murcia with the aim to contribute to the sustainability of workplaces and employee management. She participates in educational innovation projects to improve the inclusion of sustainability in the contents of management and economics degrees at the University of Murcia.

María Pemartín is an Associate Professor of Management at the Faculty of Economics and Business of the University of Murcia, Spain. Her research areas focus on Innovation, Entrepreneurship and Family Firms. She has participated in numerous research projects and published in leading journals such as *Industry and Innovation*, *Review of Managerial Science*, *Business Research Quarterly* and *Journal of Product Innovation Management*. Her interest in sustainability has led her to participate in teaching innovation projects to improve the inclusion of sustainability in the contents of management and economics degrees at the University of Murcia.