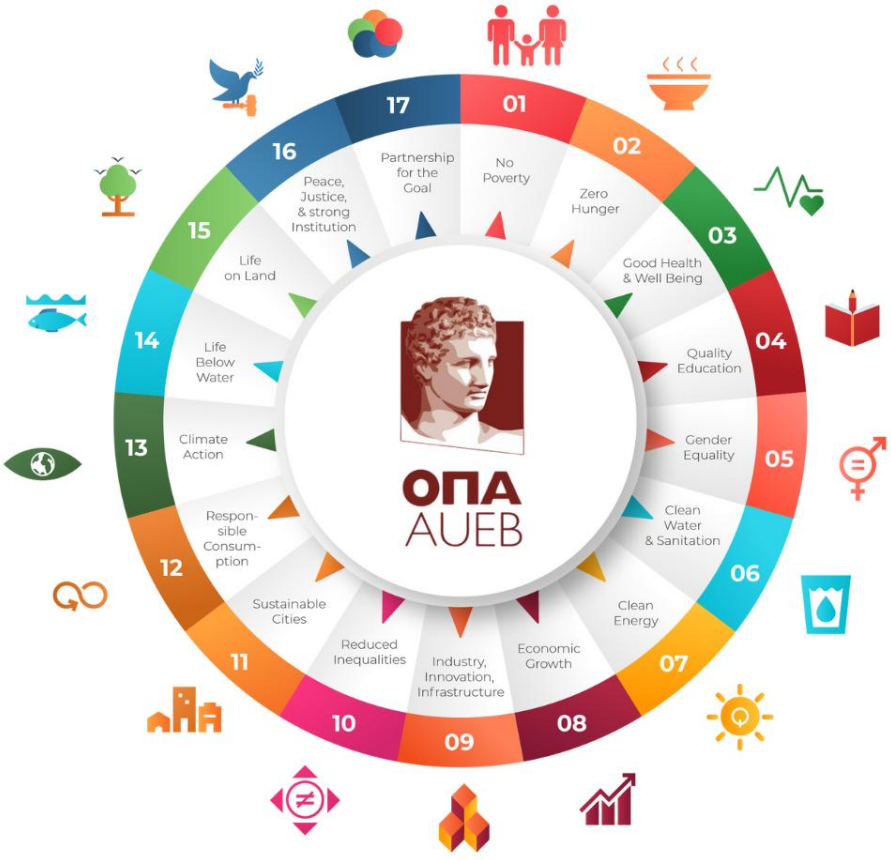
ReSEES
RESEARCH LABORATORY ON SOCIO-ECONOMIC AND ENVIRONMENTAL SUSTAINABILITY

AE4RIA
Alliance of Excellence for Research and Innovation on Aephoria

SDSN Europe

SDGs in Universities:

Athens University of Economics and Business



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"We can use the global network of universities, your university, my university, a thousand-and-more universities around the world, to be an active 'solutions network' to help governments, business, and civil society to chart out the pathways to successful sustainable development, and to be the incubators for the rapid development and rapid fusion of sustainable development technologies. Universities around the world should be in the lead of helping society to find the technical solutions to achieve these goals**"**

Jeffrey D. Sachs, Director, Sustainable Development Solutions Network (Sachs, 2015).

RESEES laboratory, Athens University of Economics and Business, July 2025

Research Laboratory on Socio-Economic and Environmental Sustainability (ReSEES) does policy-relevant interdisciplinary research on environmental, natural resources, and energy issues. The overarching goal of the team's theoretical and empirical research is the theoretical and empirical research that supports the understanding and application of Sustainable Development.

ReSEES has an impressive track record in attracting research funding from the European Commission, International Organizations, and Foundations. Research tools used by ReSEES include, among others, financial analysis, socio-economic and econometric analysis, environmental valuation, political and institutional analysis, integrated environmental-economic modeling, life cycle analysis, risk analysis, geographical information systems, game theory, information technology decision-making tools development and systems innovation approach.

ReSEES was founded and is being directed by Phoebe Koundouri, Professor at the School of Economics of the Athens University of Economics and Business since 2016 which is the outcome of the evolution of the Research Team on Socio-Economic and Environmental Sustainability. Professor Phoebe Koundouri is a world-renowned pioneer in innovative, human-centric, interdisciplinary systems for the sustainable interaction between nature, society, and the economy, including in the Stanford University list of Top 2% of world scientists with 19 published books and more than 600 published peer-reviewed scientific articles, book chapters, research, and policy reports.

ReSEES funding is affiliated with the institutions with which Prof. Phoebe Koundouri had a long-run affiliation, mainly: University of Cambridge, UK; University College London, UK; University of Cyprus, CYPRUS; Athens University of Economics and Business, GREECE; Toulouse School of Economics, FRANCE; London School of Economics, UK; The World Bank, USA; Organization for Economic Co-operation and Development, FRANCE; and consultancy projects with governments all over the world].

ReSEES is part of the Alliance of Excellence for Research and Innovation on Aeiphoria (AE4RIA), an initiative for collaboration between research institutions, innovation accelerators, and science-technology-policy interface networks, focused on sustainable development, which are founded, directed, or chaired by Prof. Phoebe Koundouri. AE4RIA includes (i) Research Institutions: Research Laboratory on Socio-Economic and Environmental

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ΟΙΚΟΝΟΜΙΚΟ ΠΑΝΕΠΙΣΤΗΜΙΟ ΑΘΗΝΩΝ ATHENS UNIVERSITY OF ECONOMICS AND BUSINESS

ReSEES Research laboratory on Socio-Economic and Environmental Sustainability

SDSN Europe

Sustainability and Stochastic Modeling and Applications Laboratory at Athens University of Economics and Business, the Sustainable Development Unit (SDU) at ATHENA Research Center , and the Department of Technology, Management, and Economics of the Technical University of Denmark (ii) Innovation Acceleration Hubs: UN Climate Change Global Innovation Hub, EIT Climate-KIC, Brigaid Connect, MENA Maritime Accelerator, Black Sea Accelerator (iii) Science-Policy Networks: Sustainable Development Solutions Network (SDSN), SDSN Global Climate Hub, SDSN Europe, SDSN Greece, Water Europe, Nexus cluster; Earth-Humanity Coalition (EHC) and (iv) Scientific Associations and Academies: World Council of Environmental and Resource Economists Associations (WCEREA), European Association of Environmental and Resource Economists (EAERE), World Academy of Art and Science (WAAS), Academia Europaea, European Academy of Sciences and Arts, InterAcademy Partnership (IAP); Academy of Engineering and Technology of the Developing World (AETDEW)

AE4RIA brings together a multidisciplinary team of over 200 researchers, including economists, mathematicians, statisticians, engineers, natural scientists, and social and human sciences experts. As one of the world's largest research networks focused on sustainability, AE4RIA provides science-based, stakeholder co-design solutions to support the global transition toward sustainable development.

Contents

1. Introduction

Universities, as centers of knowledge, innovation, and education, play a crucial role in disseminating knowledge, driving innovation, and preparing scientists to address the challenges of the present and the future. In this light, the contribution of universities to addressing the multidimensional challenges posed by a series of crises is significant.

Over the last decades, the global community has faced crises such as the financial crisis (2008), the health crisis due to the COVID-19 pandemic (2020), the energy and inflationary crisis (2021), and a series of regional armed conflicts that have caused instability in global affairs. At the pinnacle of these crises and in many ways their very source lies the climate crisis, whose impacts extend across the environment, society, and the economy.

The global community, realizing the challenges of the future, adopted the 2030 Agenda and the 17 SDGs as the roadmap that will lead us to a fairer, more socially sensitive, environmentally friendly, and resilient 2030.

On the path toward a new development model, universities, by fulfilling their educational mission, are also called to support the vision of transforming society and the economy for the benefit of the many and the planet.

The comprehensive engagement of universities, as a core engine for producing and spreading solutions to tackle poverty, inequality, climate change, and environmental degradation, underscores the critical contribution of the academic community toward achieving the Sustainable Development Goals by 2030

At the same time, the adoption of the SDGs by universities strengthens their institutional credibility and social responsibility, highlighting their role as leading agents of social change. By integrating the principles of sustainability into their operations, policies, and partnerships, higher education institutions gain the opportunity to have a positive impact not only within their walls but also in local and international communities. In addition, strategic alignment with the SDGs offers universities access to new forms of funding, partnerships with the private and public sectors, and growing interest from students seeking studies with social and global impact.

The promotion of the 17 Sustainable Development Goals (SDGs) reflects the moral and social role of universities as institutions whose mission goes beyond academic excellence to include a responsible contribution to the common good. In a world marked by growing inequalities, social crises, and environmental threats, universities are called to act as beacons of leadership and solidarity. Their alignment with the SDGs embodies their commitment to actively shaping a future founded on equality, justice, shared responsibility, and respect for both people and the planet. Through this stance, universities do not merely produce knowledge; they shape consciousness.

2. The Role of Universities in Accelerating the SDGs

Universities already contribute significantly to the Sustainable Development Goals (SDGs) through their core functions in education, research, and operations. However, to truly advance global sustainable development, they must go beyond business-as-usual and become proactive leaders in implementing the SDGs. Despite challenges from internal and external limitations, the SDGs offer a valuable framework for structural change and greater impact on local, national, and global well-being.

The SDGs can serve as a common language that unites diverse university actors, enabling a holistic, institution-wide approach to addressing global challenges. Universities can engage with the SDGs at three levels:

1. ***Recognition***: acknowledging existing contributions to the SDGs to inspire further action.
2. ***Opportunistic Alignment***: using the SDG framework to guide discrete initiatives without a unified strategy.
3. ***Organizing Principle:*** embedding the SDGs into governance and operations to make sustainable development part of everyday institutional practice.

To guide engagement, a five-step process is proposed (Figure 1):

Figure 1 *Overview of the step-by-step SDG integration process. Source: SDSN Australia/Pacific (2017)*

Step 1: Identifying and Mapping Existing Actions

The first step involves identifying and documenting a university's existing activities related to the Sustainable Development Goals (SDGs). Through this mapping process, both the areas where the institution is actively contributing and the gaps or opportunities for further engagement are revealed. This may include an assessment of curricula, research projects and publications, operational policies, student initiatives, and community partnerships. Visualizing these connections to the SDGs is a powerful tool for raising awareness among stakeholders and building a foundation for strategic planning and targeted future actions.

Step 2: Capacity Building and Active Engagement

The successful integration of the SDGs requires understanding, participation, and active engagement from the entire university community, including administration, academic and technical staff, and students. The second step focuses on strengthening the institution's capacity to support and implement the goals through multifaceted educational actions, dialogue with stakeholders, and the creation of synergies. At the same time, developing a common communication pattern around sustainable development promotes collaboration between different areas of the university and shapes a unified strategic approach.

Step 3: Identifying Priorities, Opportunities, and Gaps

Following the stages of mapping, awareness-raising, and engaging the academic community in active participation, the institution proceeds to a systematic evaluation of the findings to identify strategic priorities and potential partnerships. This third step focuses on analyzing the available resources and the institution's comparative advantages, aiming to identify actions with high added value. Ideally, this process is carried out through participatory workshops with relevant stakeholders to achieve consensus and commitment in shaping a commonly accepted action plan.

Step 4: Holistic Implementation and Integration into Institutional Operations

The fourth step concerns the translation of strategic priorities into specific policies and practices. The principles and individual objectives included in the SDGs are organically integrated into all levels of planning and operation of the institution, such as the strategic plan, educational programs, research priorities, and administrative procedures. The success of this phase requires the establishment of a coordination mechanism, institutional support, and effective dissemination of information, so that the goals do not remain isolated but become an integral part of the university's culture.

Step 5: Monitoring, Evaluation, and Communication

Continuous monitoring and evaluation of actions related to the SDGs is crucial for understanding progress and adjusting strategies. The fifth step concerns the development of indicators, reporting systems and tools to document the university's contribution. At the same time, particular emphasis is placed on communicating results both internally and externally, to enhance transparency, accountability, and the institution's reputation as a leader in sustainable

development. Effective communication is also a key element for attracting partnerships, funding and student interests.

Table 1 Supporting Tools for SDG steps 1 to 5 for the Implementation in Universities

Tools	Brief Description
Identifying and Mapping Existing Actions to SDGs	Identifies actions in education, research, and operations that are related to the SDGs, highlighting priorities and gaps.
Dialogue and Collaboration Guide (Internal & External)	Provides a framework for consultation and engagement with both the university community and external stakeholders in the design of SDG-related initiatives.
Drafting an Evidence-Based Proposal to University Leadership	Outlines the strategic value of integrating the SDGs into the university, linking them to opportunities, benefits, and institutional priorities.
Voluntary Commitment Framework for SDG Support	An official declaration of the university's support for the SDGs, affirming its commitment to education, research, and sustainable operations.
Managing Interlinkages Between the SDGs	A tool for identifying synergies and potential trade-offs among SDGs to enable more coordinated and holistic implementation.
Tools for Tracking and Evaluating SDG Contributions	Mechanisms for assessing and communicating the university's SDG impact, promoting transparency, accountability, and continuous improvement.

3. Framework to Monitor-Evaluate Contribution to the Implementation of the SDGs

To effectively support the Sustainable Development Goals (SDGs), universities must embed sustainability across four core and interconnected pillars: Learning and Teaching, Research, Organizational Governance, and External Leadership. These pillars represent the primary domains through which universities contribute to sustainable development, and they provide a practical framework for planning, implementing, and evaluating SDG action at the institutional level (Figure 2).

Figure 2 *An overview of university contributions to the SDGs. Source: SDSN Australia/Pacific (2017)*

1. Education:

This pillar reflects the university's core mission to equip students with the knowledge, skills, and values needed to understand and address the world's most pressing challenges. By integrating sustainability and Education for Sustainable Development (ESD) into curricula at all levels, universities play a pivotal role in achieving SDG 4 (Quality Education) and supporting the broader SDG agenda.

This includes embedding sustainability across disciplines, offering SDG-aligned professional training, and fostering inclusive and lifelong learning. Co-curricular and extracurricular opportunities, such as sustainability projects, student-led campaigns, and leadership networks like SDSN Youth, further strengthen student engagement and institutional impact.

The effectiveness and reach of learning and teaching efforts can be assessed by examining curriculum design, faculty development, student participation, and the preparedness of graduates to contribute to sustainable societies.

2. Research:

Universities serve as key drivers of knowledge creation, innovation, and critical inquiry. Through research, they inform policy, support technological advancement, and address societal needs aligned with the SDGs.

Contributions span from fundamental research on environmental and social systems to applied projects co-designed with communities, governments, and industry. Interdisciplinary and transdisciplinary approaches enhance the relevance and impact of university research in tackling complex sustainability challenges.

This pillar can be assessed through the alignment of research themes with the SDGs, the volume and impact of relevant publications, collaborative networks, and the translation of research into real-world solutions.

3. Organizational Governance:

Institutional governance is critical in ensuring that universities embody the principles of sustainability within their own operations and decision-making. This pillar includes the integration of the SDGs into strategic planning, policy development, resource allocation, and day-to-day operations. Sustainability can be reflected in areas such as campus energy use, procurement practices, equality and inclusion policies, ethical investment strategies, and internal capacity-building. A sustainability-oriented governance model also promotes accountability, transparency, and a shared sense of purpose across the institution.

Universities can measure progress within this pillar by examining internal strategies, governance structures, operational policies, and the degree to which sustainability is embedded across administrative processes and planning cycles.

4. External Leadership:

As anchor institutions within their communities and global networks, universities can act as powerful conveners and catalysts for change. Through partnerships, public engagement, and international collaboration, they help advance the SDGs beyond campus boundaries. This includes working with governments, civil society, and the private sector; supporting education-based development initiatives; building capacity in the Global South; offering open access SDG-related resources; and engaging alumni and external stakeholders in sustainability efforts. The strength of a university's external leadership can be reflected in the scale and quality of its partnerships, outreach programs, influence in policy arenas, and its contribution to global equity and knowledge sharing.

Together, these four pillars offer a comprehensive and actionable structure through which universities can align their missions with the Sustainable Development Goals. By assessing and advancing their contributions across these domains, institutions can move from isolated efforts to a unified, strategic, and measurable approach to sustainable development. This holistic engagement positions universities not only as educators and researchers, but also as institutional leaders in building a more just, inclusive, and sustainable world.

4. Implementation: Athens University of Economics and Business

AUEB, founded in 1920, is Greece's premier public institution in economics, business, and information sciences, and is the country's third oldest public university. It comprises three schools and eight departments (Figure 3) offering undergraduate, postgraduate (more than 30 master's programs), and doctoral studies, integrating modern academic standards with international exchanges. The School of Economic

Sciences at AUEB was established in 2012 and comprises the **Department of Economics**, the oldest Economics department in Greece, founded in 1920 and a pioneer in Greek postgraduate education since 1978, and the **Department of International and European Economic Studies**, founded in 1990. Both departments offer comprehensive undergraduate, master's, and doctoral programs, underpinned by strong research activity. Globally recognized and consistently ranked among top EU institutions in economics, the school prepares graduates for leading roles in academia, business, and public policy.

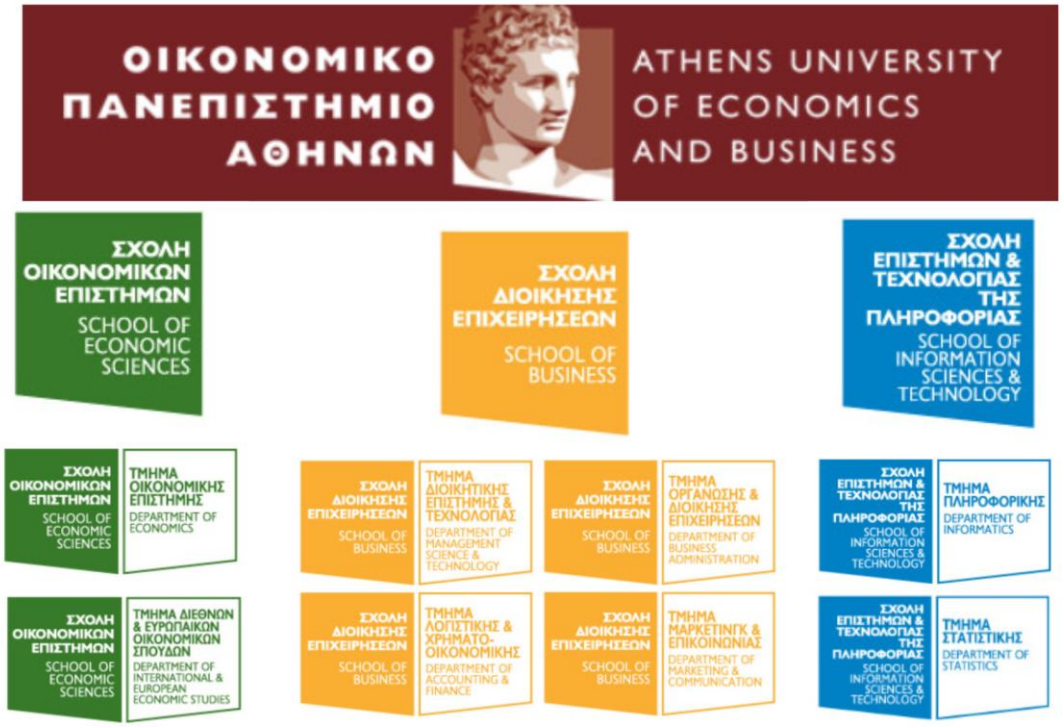


Figure 3 *Athens University of Economics and Business – Schools and Departments*

The university's mission, embedded in its 2022–2025 strategic plan, focuses on knowledge creation, societal contribution, research and teaching excellence, innovation, extroversion, and social responsibility AUEB is centrally located on Patission Street in Athens across nine buildings (~40,000 m²), with state-of-the-art labs, a modern library network, and vital academic infrastructure. Strongly outward-facing, AUEB hosts over 250 incoming Erasmus students annually, actively expands international collaborations, and offers an English-taught program, including a new English-language undergraduate degree, strengthening its global academic footprint.

The next section presents the results for the performance of AUEB under the 4 pillars of analysis (education, research, governance and external leadership), while the methodologies used are presented in detail in the Annex.

4.1 Research Pillar

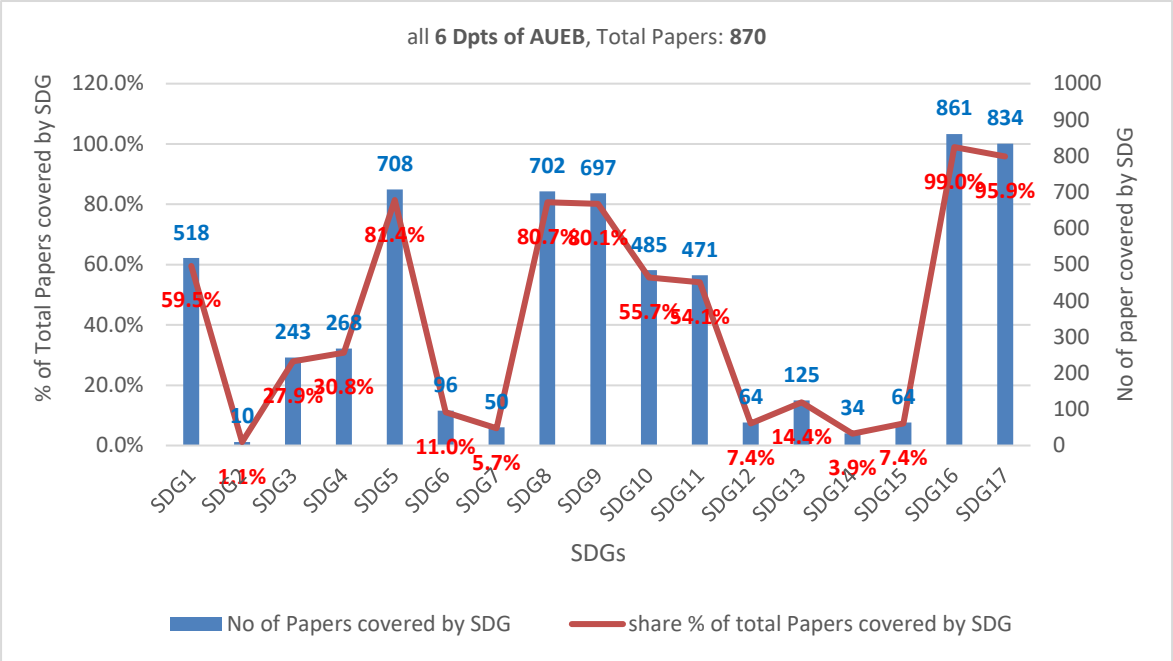


Figure 4 *SDG Contribution Overview Across All Departments of AUEB*

The analysis of **870 Working Papers** across the six departments of the Economic University reveals a distinct alignment of research priorities with specific Sustainable Development Goals (SDGs). The departments, Economics, International and European Economic Studies, Marketing, Management Science, Business Administration, and Informatics, collectively show strong engagement with institutional, governance, economic, and partnership-driven SDGs, while environmental and resource-based goals remain underrepresented.

The most prominent SDGs across all departments are **SDG 16 (Peace, Justice, and Strong Institutions)** with **99% coverage** and **SDG 17 (Partnerships for the Goals)** with **95.8%**. These figures demonstrate a dominant research orientation toward governance, institutional integrity, transparency, and international cooperation, critical enablers of sustainable development. The consistent emphasis on SDG 16 reflects the university's expertise in law, policy, compliance, and digital governance frameworks, while SDG 17 underscores its role in global partnerships, trade, and multi-stakeholder collaboration, essential for addressing transnational economic challenges.

SDG 8 (Decent Work and Economic Growth) and **SDG 9 (Industry, Innovation, and Infrastructure)**, scoring **80.7%** and **80.1%**, respectively, further confirm the strong economic dimension of the university's research agenda. These results highlight contributions to labor market analysis, productivity, and industrial innovation, including the digital transformation of business models. Additionally, **SDG 5 (Gender Equality)** at **81.4%** signals a commendable focus on diversity, inclusion, and reducing gender gaps in the labor market, while **SDG 1 (No Poverty)** with **59.5%** reflects efforts to integrate poverty reduction and inclusive economic growth into policy research. **SDG 10 (Reduced Inequalities)** and **SDG 11 (Sustainable Cities)** also hold solid

positions, emphasizing social justice and urban sustainability, key themes in modern economic governance.

In contrast, environmental and resource-related goals exhibit very low engagement. **SDG 2 (Zero Hunger)** and **SDG 14 (Life Below Water)** score marginally, reflecting minimal involvement in agri-food systems and marine resource sustainability, areas increasingly linked to the global food security and blue economy agenda. Similarly, **SDG 3 (Good Health and Well-being)**, **SDG 4 (Quality Education)**, **SDG 6 (Clean Water and Sanitation)**, and **SDG 7 (Affordable and Clean Energy)** remain underrepresented, each below **15%**, despite their strong global relevance. Equally concerning is the limited focus on **SDG 12 (Responsible Consumption and Production)** and **SDG 13 (Climate Action)**, which are central to the EU Green Deal and global climate resilience frameworks. **SDG 15 (Life on Land)** also ranks very low, signaling little integration of biodiversity and land-use considerations into economic models.

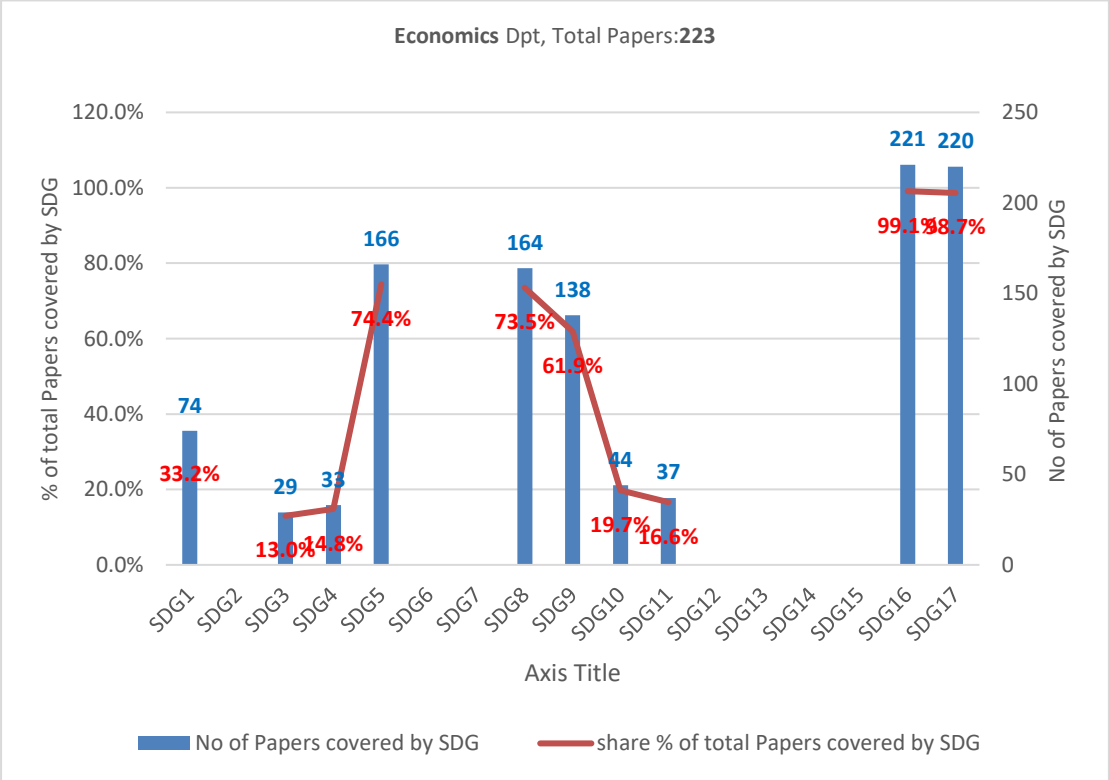


Figure 5 *SDG Contribution Profile – Department of Economics*

The analysis of the **223 Working Papers** produced by the **Department of Economics** reveals a remarkable concentration on governance and partnerships within the Sustainable Development Goals (SDGs) framework. **SDG 16 (Peace, Justice, and Strong Institutions)** stands out with an exceptionally high relevance score of **99.1%**, highlighting the department's strong research orientation toward institutional quality, governance structures, transparency, and legal frameworks, critical components for stable and efficient economies. Similarly, **SDG 17 (Partnerships for the Goals)** follows closely with **98.7%**, indicating the department's active focus on global economic cooperation, trade agreements, policy harmonization, and multi-stakeholder strategies to achieve sustainable development. This combination suggests a robust

academic interest in enabling conditions for sustainable economic systems, where strong institutions and collaborative mechanisms are essential for success. High attention to these SDGs reflects current global priorities, particularly in contexts such as EU integration, economic resilience, and post-crisis governance. The notable relevance of **SDG 5 (Gender Equality)** at **74.4%** and **SDG 9 (Industry, Innovation, and Infrastructure)** at **61.9%** complements this focus, revealing a holistic approach that links institutional development with innovation and inclusivity

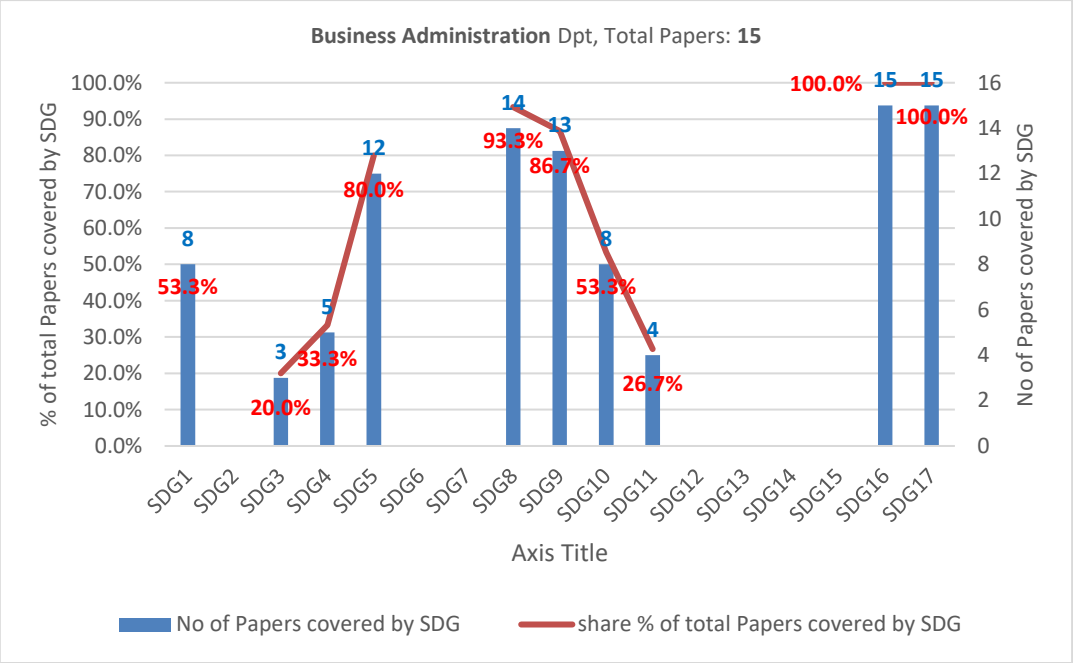


Figure 6 *SDG Contribution Profile – Department of Business Administration*

The **Department of Business Administration**, with a total of **15 Working Papers**, demonstrates a very strong alignment with institutional and partnership-oriented Sustainable Development Goals (SDGs). The data show that **SDG 16 (Peace, Justice, and Strong Institutions)** and **SDG 17 (Partnerships for the Goals)** both achieve **100% coverage**, meaning that every single paper addresses these two goals. This is a remarkable result and reflects the department's emphasis on governance, ethical business practices, and the strategic role of partnerships in modern organizational contexts. These findings highlight the department's commitment to research areas such as corporate governance, compliance, accountability, and cross-sector collaboration, which are essential enablers of sustainable development and business resilience. The extremely high scores for SDG 16 and SDG 17 indicate the department's core contribution to building transparent, accountable institutions and fostering cross-sector and international partnerships, key enablers for achieving the entire SDG agenda. This aligns the department's research with critical global priorities for sustainability and governance.

Beyond these, **SDG 8 (Decent Work and Economic Growth)** and **SDG 9 (Industry, Innovation, and Infrastructure)** also show high relevance, at **93.3%** and **86.7%**, respectively, suggesting a strong focus on economic performance and innovation within sustainable frameworks. Conversely, goals like **SDG 3 (Good Health and Well-being)** and **SDG 11 (Sustainable Cities and Communities)** display

lower representation, indicating a more limited role in the department's research priorities.

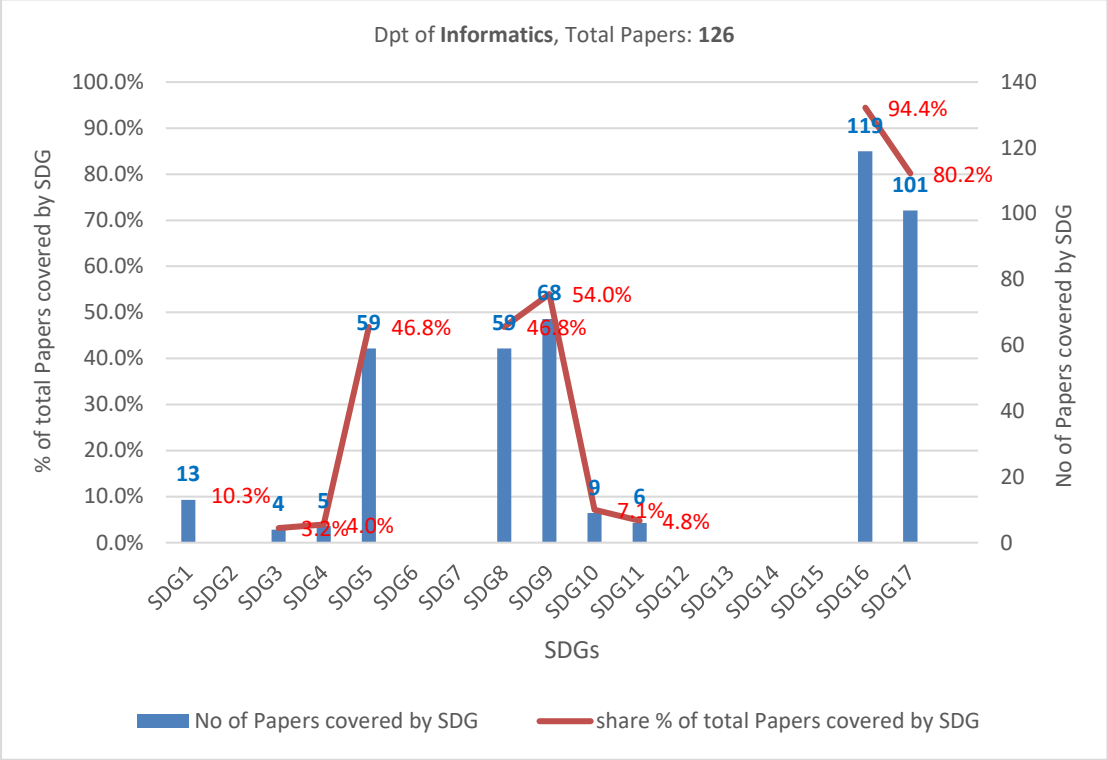


***Figure 7** SDG Contribution Profile – Department of Informatics*

The **Department of Informatics**, with 126 Working Papers, shows a strong alignment with institutional integrity and global cooperation within the SDG framework. SDG 16 (Peace, Justice, and Strong Institutions) leads with 94.4%, and SDG 17 (Partnerships for the Goals) follows closely at 80.2%. This remarkable concentration reflects the department's research focus on governance through technology, secure digital infrastructures, cybersecurity, and the role of ICT in supporting strong institutional frameworks. The high relevance of SDG 17 further highlights the department's contribution to global partnerships, data interoperability, and collaborative platforms that foster international cooperation in the digital era.

Other SDGs with notable coverage include SDG 9 (Industry, Innovation, and Infrastructure) at 54.0%, and SDG 5 (Gender Equality) and SDG 8 (Decent Work and Economic Growth) both at 46.8%, showcasing informatics as an enabler for technological advancement, inclusive innovation, and workforce transformation. In contrast, health-related and social goals such as SDG 3 (Good Health and Well-being) and SDG 4 (Quality Education) show low representation (below 6%), indicating areas for improvement. The dominance of SDGs 16 and 17 positions the department as a leader in digital governance & cooperation and technological diplomacy.

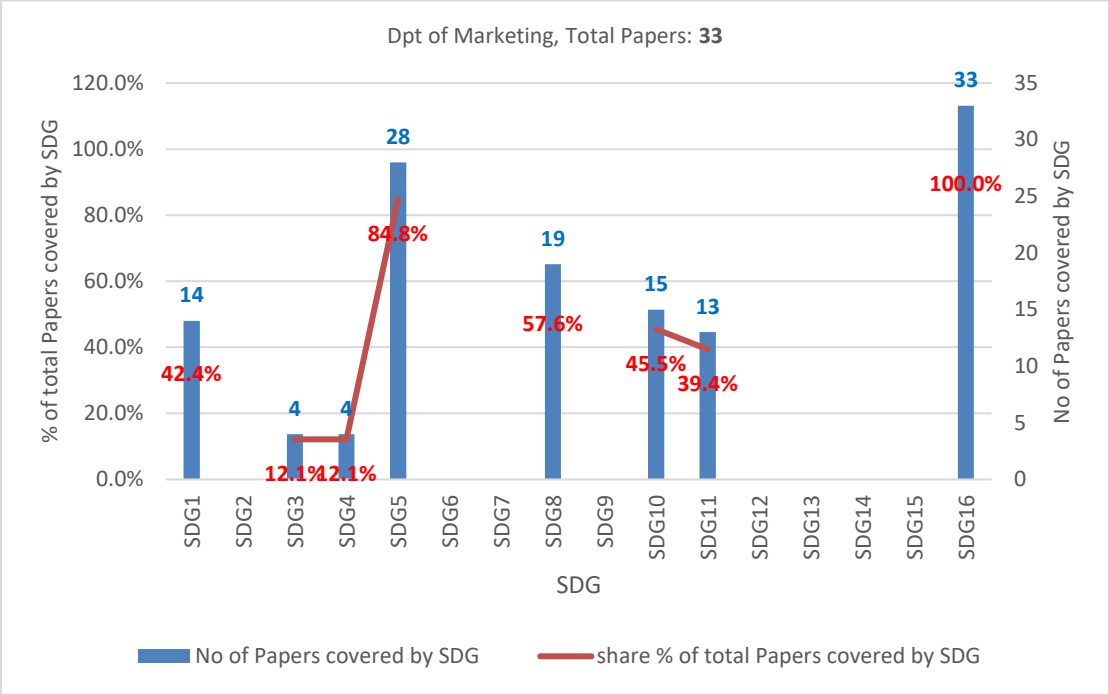


Figure 8 *SDG Contribution Profile – Department of Business Administration*

The **Department of Marketing**, with **33 Working Papers**, demonstrates a strong alignment with governance and collaborative frameworks in sustainability research. Both **SDG 16 (Peace, Justice, and Strong Institutions)** and **SDG 17 (Partnerships for the Goals)** achieve **100% coverage**, indicating that every paper addresses issues related to institutional integrity, ethics, and cooperative strategies. This is particularly relevant in marketing, where trust, transparency, and stakeholder engagement are essential for sustainable business practices and international collaborations. Such emphasis highlights the department's contribution to responsible governance and the role of marketing in fostering global partnerships and corporate accountability.

Other high-ranking SDGs include **SDG 5 (Gender Equality)** at **84.8%**, showing a strong interest in diversity and inclusion in marketing strategies, and **SDG 9 (Industry, Innovation, and Infrastructure)** at **75.8%**, reflecting the department's engagement with digital transformation, smart technologies, and innovative communication channels. However, **SDG 3 (Good Health and Well-being)** and **SDG 4 (Quality Education)** are represented at just **12.1%**.

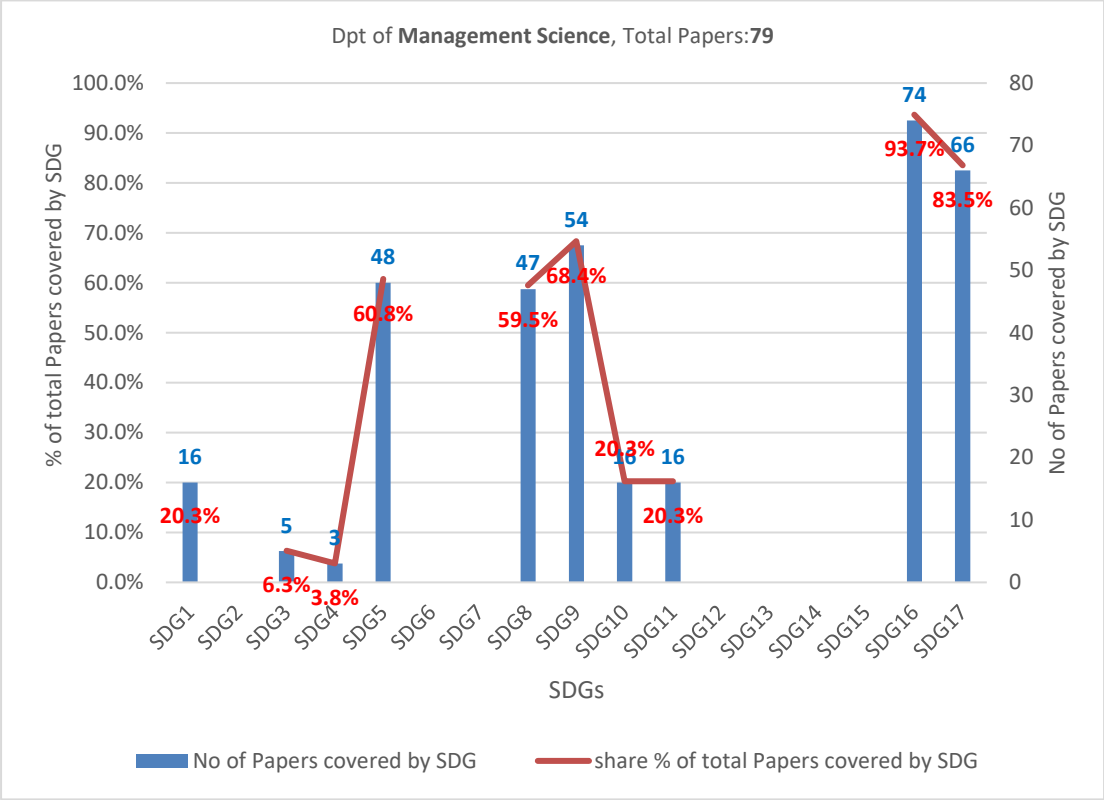


Figure 9 *SDG Contribution Profile – Department of Management Science*

The **Department of Management Science**, with **79 Working Papers**, demonstrates a strong alignment with SDGs related to governance, partnerships, innovation, and inclusive growth. **SDG 16 (Peace, Justice, and Strong Institutions)** leads with **93.7%**, followed by **SDG 17 (Partnerships for the Goals)** at **83.5%**, underscoring the department's emphasis on institutional integrity, ethical governance, and strategic alliances. This strong focus indicates research on compliance systems, digital governance, and collaborative frameworks for sustainability.

Among operational and innovation-related goals, **SDG 9 (Industry, Innovation, and Infrastructure)** scores **68.4%**, reflecting significant interest in digital transformation, process optimization, and smart infrastructure. **SDG 5 (Gender Equality)** and **SDG 8 (Decent Work and Economic Growth)** show notable presence at **60.8%** and **59.5%**, highlighting the department's engagement with diversity, inclusion, and workforce sustainability in management strategies. Lower coverage for **SDG 3 (Good Health)** and **SDG 4 (Quality Education)** indicates limited integration of health-focused or lifelong learning research in management practices.

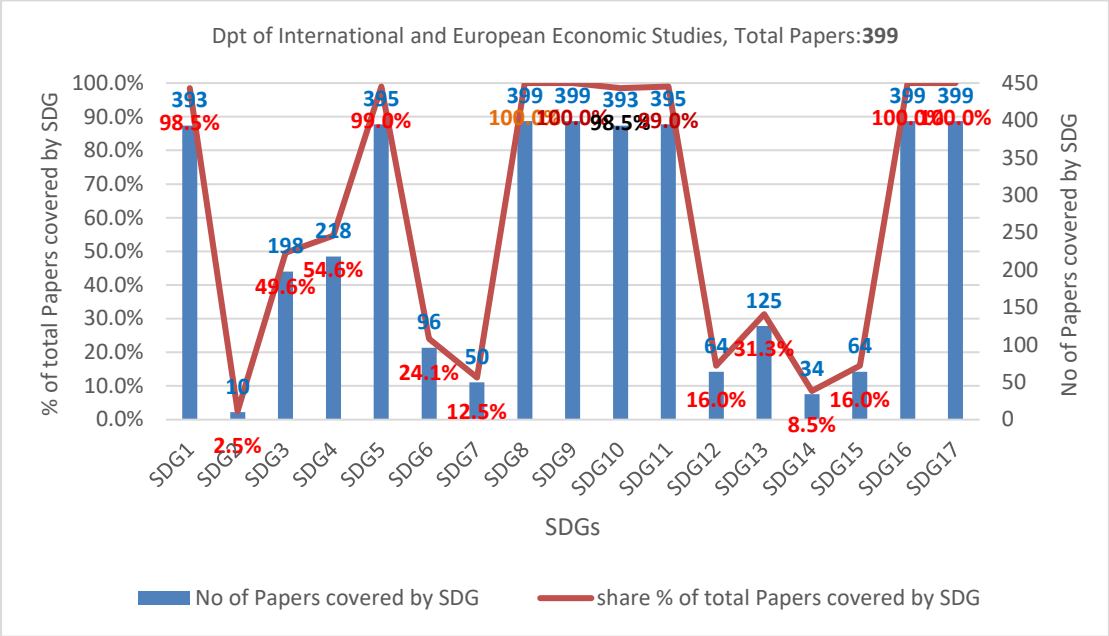


Figure 10 *SDG Contribution Profile – Department of International and European Economic Studies*

The **Department of International and European Economic Studies** with **399 Working Papers**, demonstrates exceptional coverage of multiple SDGs, indicating a comprehensive and policy-driven research agenda. **SDG 8 (Decent Work and Economic Growth)**, **SDG 9 (Industry, Innovation, and Infrastructure)**, **SDG 10 (Reduced Inequalities)**, **SDG 11 (Sustainable Cities and Communities)**, **SDG 16 (Peace, Justice, and Strong Institutions)**, and **SDG 17 (Partnerships for the Goals)** all achieve **100% coverage**, reflecting the department's strong emphasis on governance, institutional resilience, economic growth, and global cooperation. This high representation suggests research deeply embedded in international policy frameworks, structural reforms, and institutional development critical for sustainable progress.

Additionally, **SDG 1 (No Poverty)** scores **98.5%**, and **SDG 5 (Gender Equality)** achieves **99%**, underlining significant attention to social equity and inclusive development within economic systems. These results demonstrate a balanced integration of economic, institutional, and social dimensions, positioning the department as a leader in advancing holistic sustainable development strategies at both regional and international levels.

4.2 Education Pillar

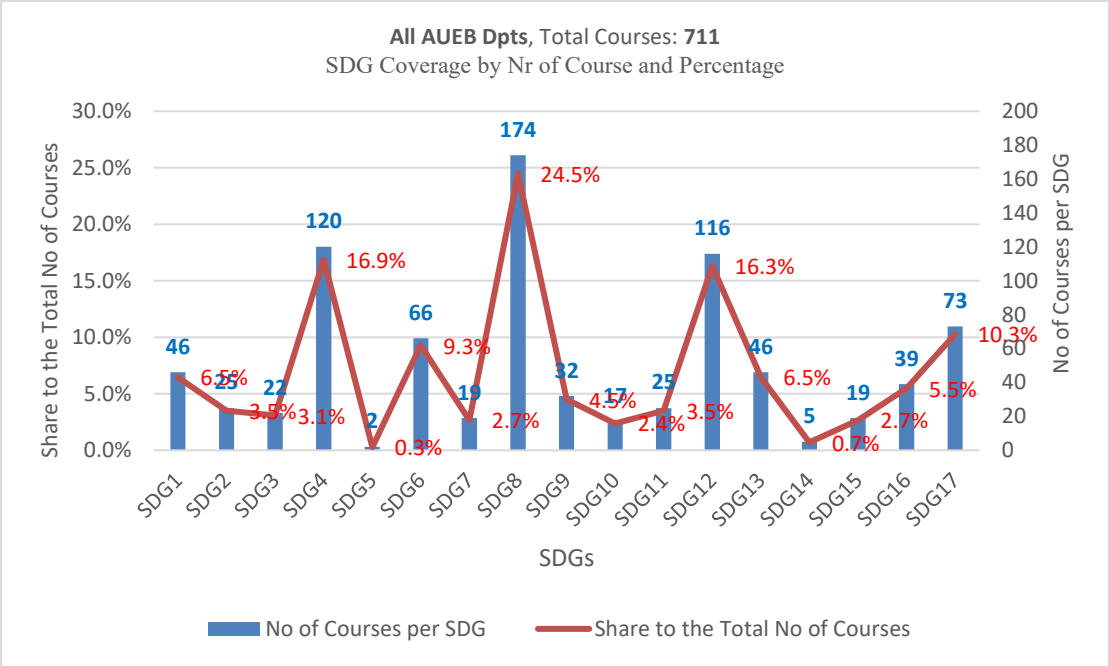


Figure 11 *SDG Alignment of Educational Programs Across All AUEB Departments*

The analysis of the 711 courses offered by the eight departments of the Economic University highlights a strong alignment with specific Sustainable Development Goals (SDGs). SDG 8 (Decent Work and Economic Growth) emerges as the most prominent, accounting for 24.5% of all courses. This reflects the core mission of economic and business education, emphasizing employment, economic performance, and productivity-related topics across multiple departments. Following this, SDG 4 (Quality Education) ranks second at 16.9%, underscoring the institution's role in fostering knowledge, lifelong learning, and educational inclusiveness. SDG 12 (Responsible Consumption and Production) closely follows at 16.3%, indicating significant engagement with sustainability principles, resource efficiency, and circular economy concepts, particularly relevant in economics, marketing, and business curricula. SDG 17 (Partnerships for the Goals) holds 10.3%, reflecting the global and cooperative perspective integrated into programs such as International and European Economic Studies. Lower representation is seen for SDG 1 (No Poverty) at 6.5%, SDG 3 (Good Health and Well-being) at 3.5%, and SDG 7 (Affordable and Clean Energy) at 2.7%, suggesting these themes are less central but still present. Given the course distribution, ranging from 51 courses in Statistics to 170 in International Studies, these patterns illustrate how department focus shapes SDG integration within the overall curriculum.

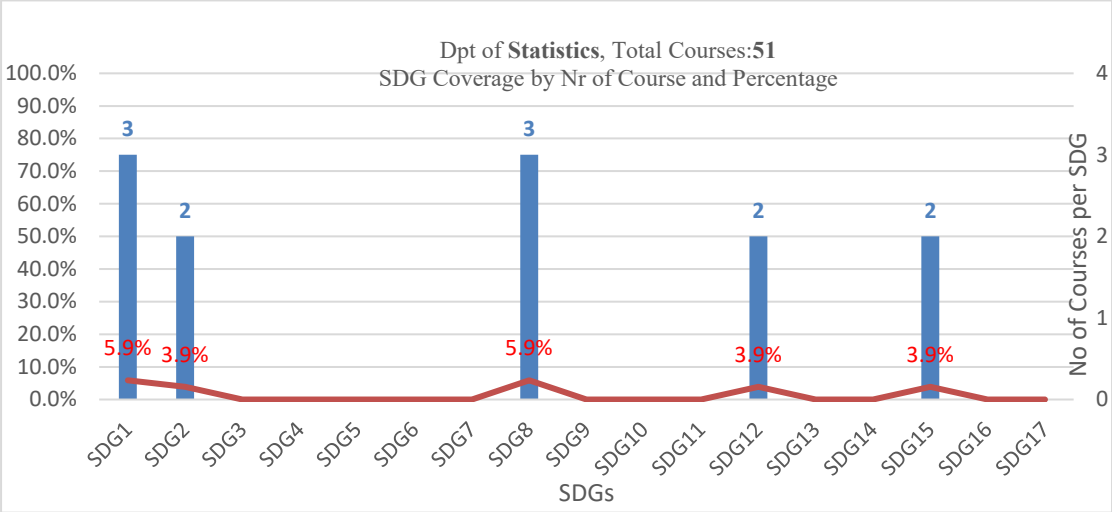


Figure 12 *SDG Alignment in Course Offerings – Department of Statistics*

Within the **Department of Statistics**, which offers **51 courses**, the analysis of SDG relevance reveals an interesting pattern. **SDG 8 (Decent Work and Economic Growth)** and **SDG 1 (No Poverty)** share the highest relevance score, each at **5.9%**. This alignment reflects the department's contribution to understanding labor markets, income distribution, and economic development through statistical modeling and data analysis. The emphasis on SDG 8 also highlights the role of statistical methods in measuring productivity and employment indicators, essential for informed economic policy making. SDG 1's presence indicates a focus on poverty measurement and socio-economic inequality, critical areas for sustainable development. Additionally, **SDG 2 (Zero Hunger)**, **SDG 12 (Responsible Consumption and Production)**, and **SDG 15 (Life on Land)** each account for **3.9%**, signaling the department's indirect involvement in areas like food security analysis, sustainable resource management, and environmental monitoring. While these percentages are modest, they demonstrate the interdisciplinary potential of statistics in addressing sustainability challenges beyond the core economic agenda. Overall, the distribution suggests that the department primarily supports SDGs linked to economic growth and social welfare, while offering a foundational analytical role in environmental and production-related goals through applied statistical techniques.

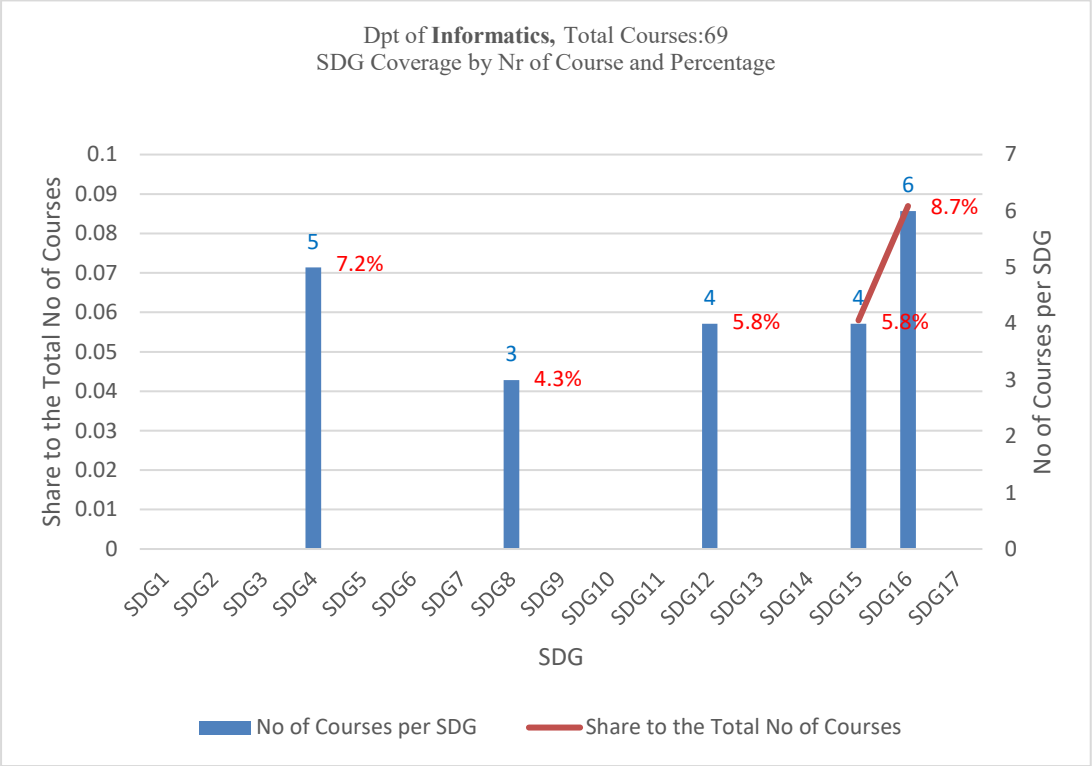


Figure 13 *SDG Alignment in Course Offerings – Department of Informatics*

In the **Department of Informatics**, which offers **69 courses**, the integration of Sustainable Development Goals (SDGs) reveals a distinct orientation toward governance, transparency, and sustainable practices through technology. **SDG 16 (Peace, Justice, and Strong Institutions)** holds the highest share of relevance at **8.7%**, reflecting the crucial role of informatics in promoting secure, transparent, and accountable systems, such as e-governance platforms and cybersecurity frameworks. This highlights how digital innovation supports institutional integrity and resilience. Following this, both **SDG 12 (Responsible Consumption and Production)** and **SDG 16** (secondary score) appear at **5.8%**, suggesting significant emphasis on sustainable digital practices, such as energy-efficient computing, data-driven sustainability solutions, and responsible technology lifecycle management. **SDG 8 (Decent Work and Economic Growth)** at **4.3%** underscores the department's contribution to digital transformation in labor markets, automation, and productivity enhancement. Meanwhile, **SDG 4 (Quality Education)**, accounting for **3.9%**, reflects the department's role in advancing digital literacy and lifelong learning, both essential for modern education systems. Overall, the distribution demonstrates that Informatics serves as an enabler of sustainability by strengthening institutions, promoting responsible production, and fostering inclusive economic growth, while embedding education and innovation at the heart of its academic mission.

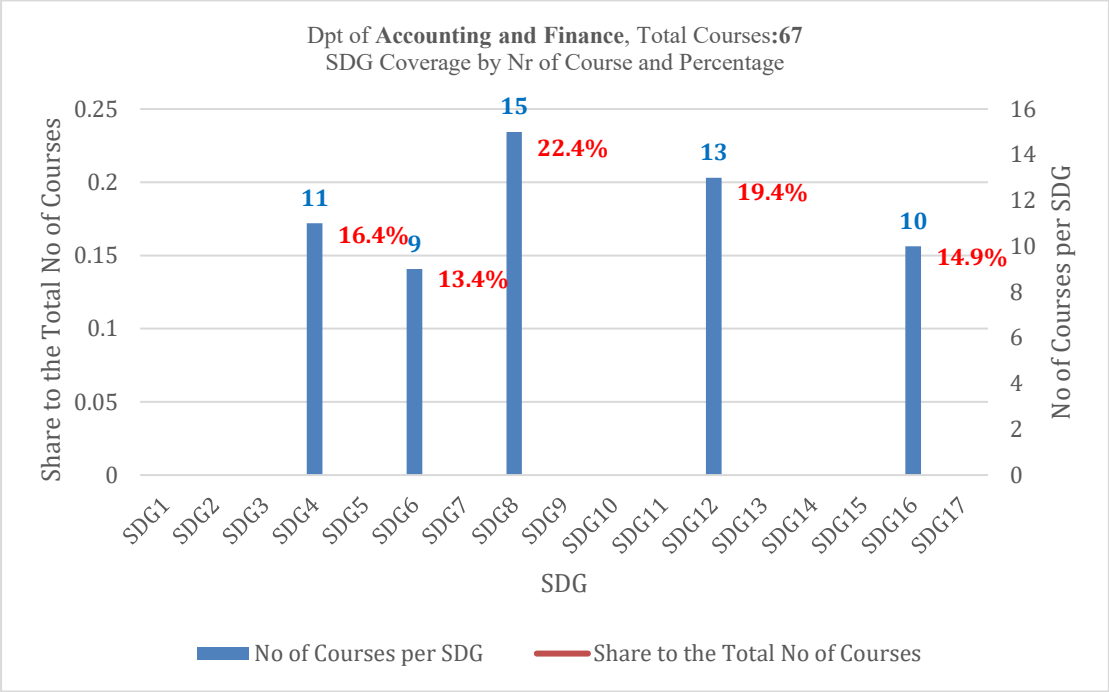


Figure 14 *DG Alignment in Course Offerings – Department of Accounting and Finance*

In the **Department of Accounting & Finance**, which offers **67 courses**, the alignment with Sustainable Development Goals (SDGs) strongly reflects the department's focus on economic performance, transparency, and sustainability in financial systems. **SDG 8 (Decent Work and Economic Growth)** holds the highest share of relevance at **22.4%**, emphasizing the role of accounting and finance in fostering employment, sustainable economic policies, and responsible growth. Following closely, **SDG 12 (Responsible Consumption and Production)** at **19.4%** demonstrates the department's engagement with sustainability reporting, corporate social responsibility, and integrating environmental considerations into financial decision-making. **SDG 4 (Quality Education)** accounts for **16.4%**, highlighting the department's contribution to knowledge dissemination and professional skills development in finance and accounting education. Meanwhile, **SDG 16 (Peace, Justice, and Strong Institutions)** at **14.9%** underlines the importance of governance, transparency, auditing, and anti-corruption practices, key principles in building trust within financial markets and institutions. Finally, **SDG 6 (Clean Water and Sanitation)** at **13.4%** reflects the indirect but meaningful role of financial mechanisms in supporting infrastructure investments and sustainable water management projects. Overall, this distribution underscores the department's strong alignment with economic, institutional, and sustainability-oriented goals, positioning accounting and finance as a cornerstone for achieving responsible and inclusive growth.

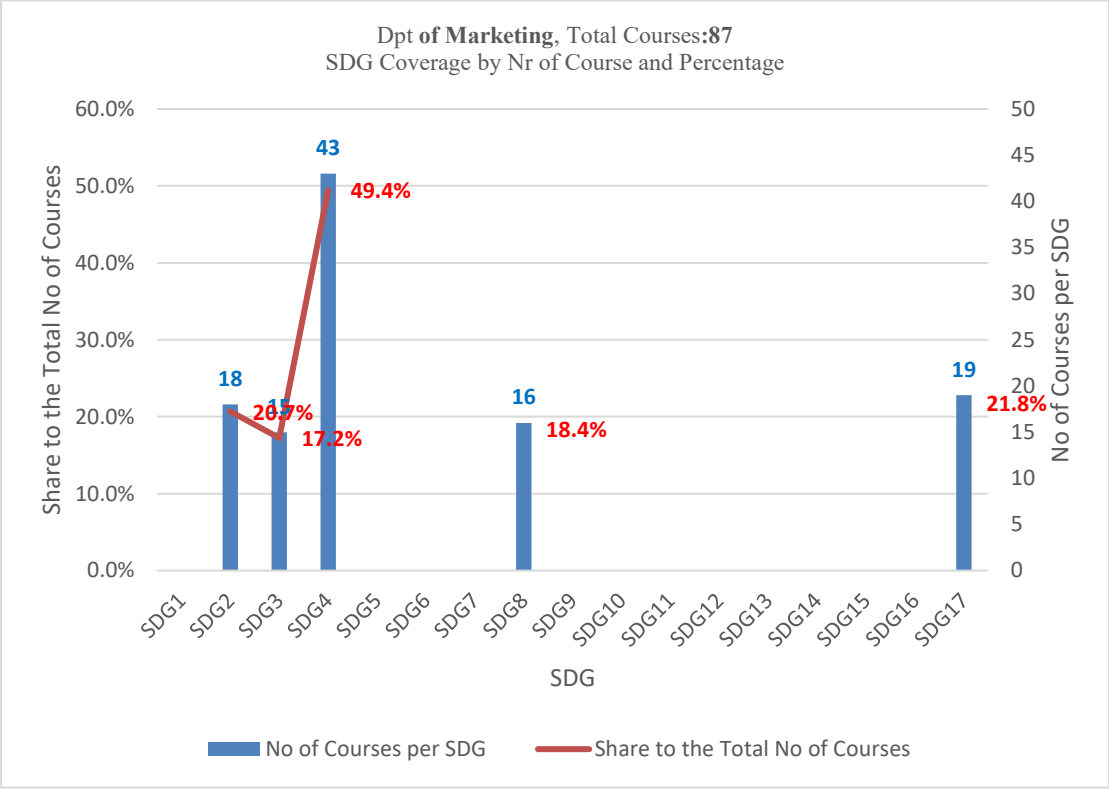


Figure 15 *SDG Alignment in Course Offerings – Department of Marketing*

In the **Department of Marketing**, which offers **87 courses**, the analysis reveals a strong orientation toward education and partnerships within the sustainability context. **SDG 4 (Quality Education)** dominates with an impressive **49.4%**, highlighting the department's primary mission to cultivate knowledge, skills, and critical thinking essential for marketing professionals in a dynamic global market. This reflects an emphasis on developing educational strategies that integrate sustainability principles, ethical marketing practices, and consumer awareness. **SDG 17 (Partnerships for the Goals)** follows at **21.8%**, illustrating the department's role in promoting collaboration between businesses, institutions, and stakeholders to achieve sustainability objectives, critical in marketing strategies that rely on networks and alliances. **SDG 2 (Zero Hunger)** at **20.1%** likely connects to themes such as sustainable food marketing, agricultural supply chains, and social campaigns addressing hunger, demonstrating marketing's influence beyond traditional commerce. Additionally, **SDG 8 (Decent Work and Economic Growth)** at **18.4%** reflects the link between marketing and economic performance, job creation, and fair employment practices. Finally, **SDG 3 (Good Health and Well-being)** with **17.2%** points to marketing's contribution to health-oriented campaigns, consumer safety, and wellness promotion. Overall, the distribution shows marketing's potential as a driver for education, social impact, and sustainable development through strategic communication and stakeholder engagement.

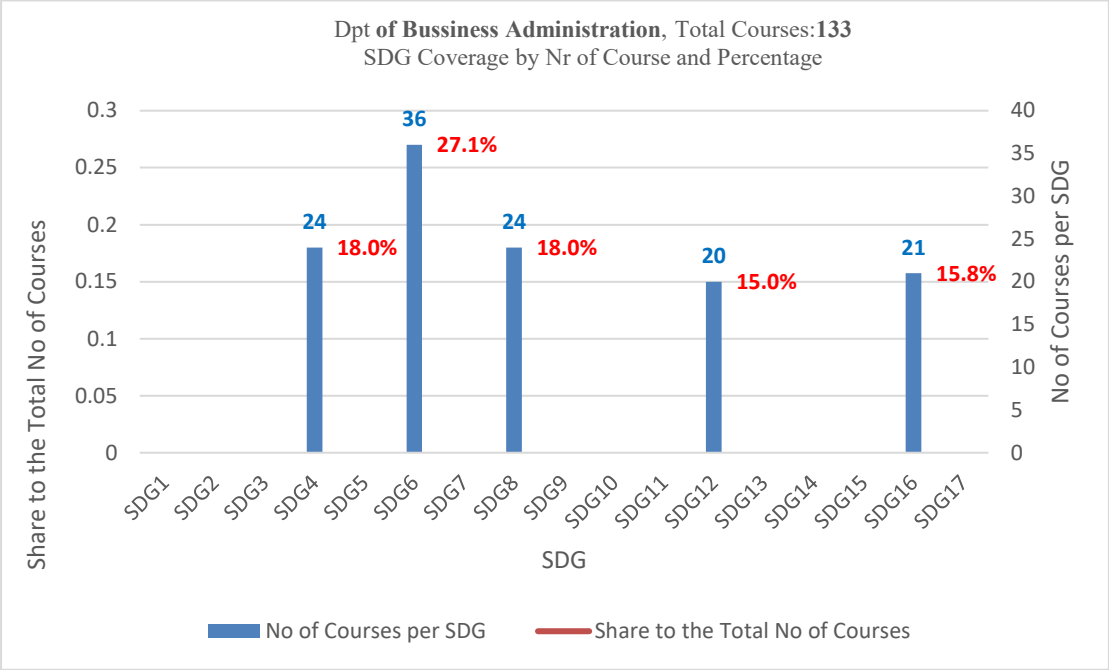


Figure 16 SDG Alignment in Course Offerings – Department of Business Administration

In the **Department of Business Administration**, which offers **133 courses**, the integration of Sustainable Development Goals (SDGs) indicates a diverse focus on sustainability, governance, and education. **SDG 6 (Clean Water and Sanitation)** has the highest share at **27.1%**, which is notable for a business-oriented department. This likely reflects the emphasis on corporate social responsibility (CSR), sustainability reporting, and strategic management practices addressing water efficiency, resource stewardship, and compliance with environmental standards. Following this, **SDG 4 (Quality Education)** and **SDG 8 (Decent Work and Economic Growth)** each represent **18.0%**, highlighting the department's dual role in shaping future leaders through high-quality education and promoting responsible business practices that drive inclusive economic growth. **SDG 16 (Peace, Justice, and Strong Institutions)** accounts for **15.8%**, signaling the importance placed on ethical governance, transparency, and anti-corruption measures in business operations. Similarly, **SDG 12 (Responsible Consumption and Production)** at **15.0%** demonstrates commitment to sustainability in supply chains, resource use, and corporate practices aligned with circular economy principles. Overall, the distribution shows that Business Administration serves as a key driver of sustainability by embedding environmental, social, and governance (ESG) considerations into managerial education, aligning business strategy with global development priorities.

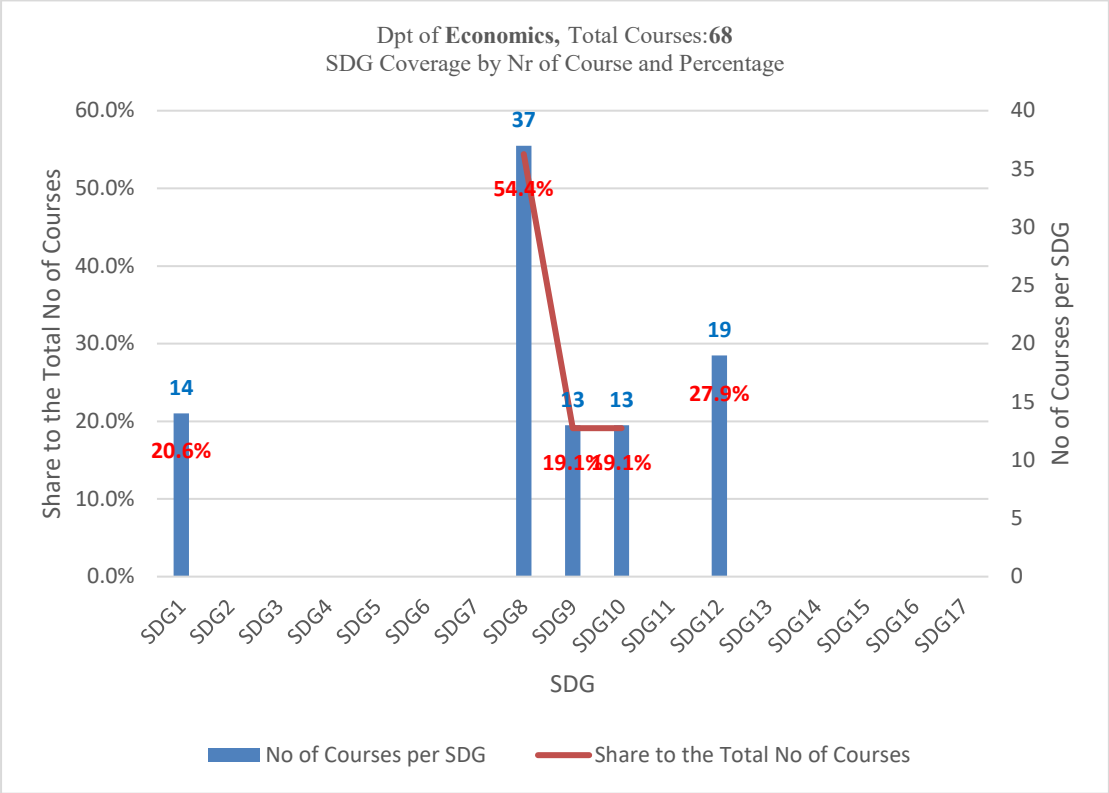


Figure 17 SDG Alignment in Course Offerings – Department of Economics

In the **Department of Economics**, which offers **68 courses**, the alignment with Sustainable Development Goals (SDGs) clearly emphasizes economic growth and sustainability. **SDG 8 (Decent Work and Economic Growth)** stands out with the highest relevance at **54.4%**, reflecting the department's central role in studying labor markets, productivity, macroeconomic stability, and inclusive growth strategies. This strong emphasis highlights the focus on policies that promote employment and sustainable economic development, which are fundamental to economics education. Following this, **SDG 12 (Responsible Consumption and Production)** accounts for **27.9%**, illustrating the integration of sustainability principles into economic analysis, particularly regarding resource efficiency, waste reduction, and circular economy models. **SDG 1 (No Poverty)** at **20.6%** underscores the department's commitment to poverty reduction strategies and income redistribution policies, while **SDG 10 (Reduced Inequalities)** at **19.1%** reinforces the importance of equity and social inclusion in economic planning. Similarly, **SDG 9 (Industry, Innovation, and Infrastructure)**, also at **19.1%**, reflects attention to industrial development, technological innovation, and infrastructure investments as drivers of long-term growth. Overall, these figures demonstrate that the Department of Economics places a strong emphasis on sustainable growth, social equity, and structural transformation, aligning its curriculum closely with the economic and social dimensions of the 2030 Agenda.

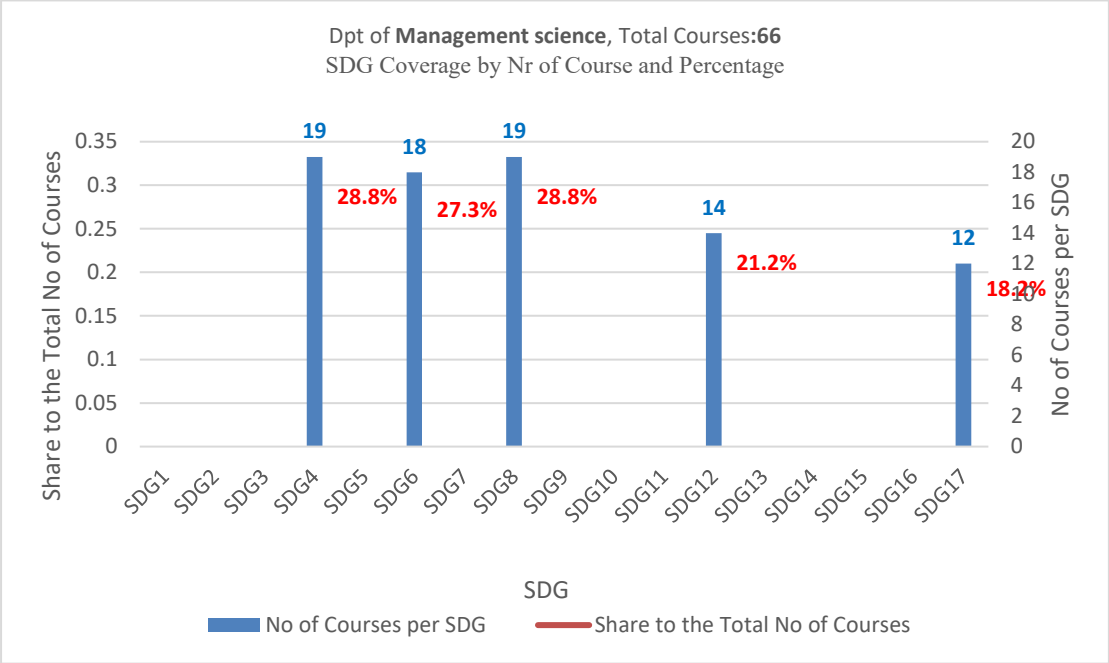


Figure 18 SDG Alignment in Course Offerings – Department of Management

In the **Department of Management Science**, which offers **66 courses**, the analysis of SDG relevance highlights a strong emphasis on education, sustainability, and inclusive growth. **SDG 4 (Quality Education)** and **SDG 8 (Decent Work and Economic Growth)** share the highest relevance, each accounting for **28.8%**, reflecting the department's dual mission to provide high-quality academic programs while preparing graduates for meaningful participation in dynamic labor markets. This alignment underscores the importance placed on lifelong learning, managerial skills, and strategies that promote economic resilience and decent employment opportunities. **SDG 6 (Clean Water and Sanitation)** follows closely at **27.3%**, signaling the growing recognition of water stewardship and sustainable resource management as strategic issues in modern organizations. **SDG 12 (Responsible Consumption and Production)** at **21.2%** further demonstrates the department's commitment to embedding sustainability principles in business operations, including efficiency, waste reduction, and sustainable supply chain design. Finally, **SDG 17 (Partnerships for the Goals)** at **18.2%** emphasizes the critical role of collaboration, multi-stakeholder engagement, and international partnerships in achieving sustainable development objectives. Overall, these figures suggest that the Department of Management Science integrates environmental and social considerations into its curriculum, aligning leadership and operational strategies with global sustainability priorities.

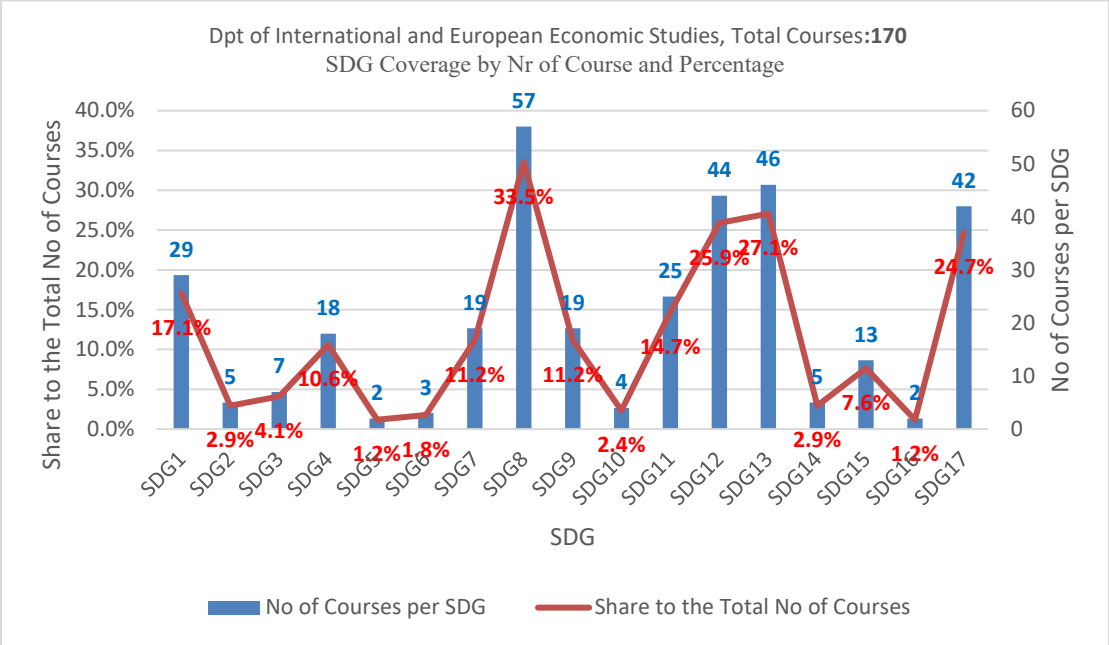


Figure 19 *SDG Alignment in Course Offerings – Department of International and European Economic Studies*

In the **Department of International and European Economic Studies**, which offers **170 courses**, the curriculum demonstrates a strong alignment with key Sustainable Development Goals (SDGs) that reflect global economic, environmental, and social priorities. **SDG 8 (Decent Work and Economic Growth)** holds the highest share at **33.5%**, emphasizing the department's core focus on fostering sustainable economic growth, employment policies, and competitive markets in an international context. **SDG 13 (Climate Action)** follows with **27.1%**, illustrating a growing integration of climate policies and environmental economics into the academic framework, preparing graduates to address climate-related challenges in global governance. **SDG 12 (Responsible Consumption and Production)** at **25.9%** highlights the department's commitment to sustainable trade and resource efficiency, essential in shaping modern supply chains. Similarly, **SDG 17 (Partnerships for the Goals)** at **24.7%** reflects the importance of international cooperation, trade agreements, and institutional frameworks for achieving the 2030 Agenda. Additional SDGs such as **SDG 1 (No Poverty)**, **SDG 11 (Sustainable Cities)**, and **SDG 7 (Clean Energy)**, alongside **SDG 9 (Industry and Innovation)**, further demonstrate the department's interdisciplinary approach. This distribution confirms that the department prioritizes economic resilience, environmental responsibility, and global collaboration, aligning its academic mission with sustainable development on a worldwide scale.

4.3 Governance/ Operations Pillar

Table 2 summarizes the most important actions/projects of the university to streamline SDGs in each governance and day-to-day operations, classified by SDG.

Table 2 AUEB Operation/ Activities per SDG

SDG	Actions
	• Volunteer collaborations with NGOs (Steps, Fabric Republic, Fainareti)
	• scholarships to low-income students
	• fundraising events
SDG 1	• OPAnews articles on poverty.
SDG 2	• Partnership with Boroume to support food redistribution and reduce food waste.
	• Implementation of health and safety protocols
	• publication of COVID-19 HR guide
SDG 3	• emergency preparedness drills.
	• School supply donations
	• free tutoring
	• curriculum integration of sustainability and ethics
	• lifelong learning programs
	• inclusive support services
SDG 4	• student competitions and incubators.
	• Establishment and operation of Gender Equality Committee
SDG 5	• gender policy research and advocacy.
SDG 6	• Participation in the 'Water for Tomorrow' program by Athenian Brewery and the Cluster of Sustainability Transition.
	• Energy-efficient building upgrades
	• use of renewable energy sources
SDG 7	• transition to LED lighting.
	• Career days
	• innovation incubators (ACEIn)
	• practical training programs
SDG 8	• support for staff development.
	• Support for innovation through entrepreneurship centers
SDG 9	• collaboration with tech/business stakeholders.
	• Scholarships based on academic and socio-economic criteria
SDG 10	• partnership with EDHEC Business School.

	• OPA Run supporting 17 NGOs
SDG 11	• promoting inclusion and health through civic sports engagement.
	• Digitalization of processes
	• recycling stations
SDG 12	• efficient resource management.
	• Shift to natural gas heating
	• replacement of light bulbs
SDG 13	• CO_2 and pollutant reductions.
SDG 14	• Partnership with BlueCycle to promote circular economy using marine waste.
SDG 15	• Research and awareness campaigns on biodiversity and land sustainability.
	• Legal support services
	• transparent governance
	• anti-corruption education
SDG 16	• inclusive regulations.
	• Academic and research partnerships
	• participation in UN SDSN
SDG 17	• stakeholder outreach activities.

The Athens University of Economics and Business (AUEB) has implemented a range of governance and operational actions that reflect a growing alignment with the United Nations Sustainable Development Goals (SDGs). Through volunteer initiatives, administrative reforms, environmental upgrades, and inclusive policies, AUEB's internal measures demonstrate an emerging commitment to sustainability, even though many quantitative outcomes remain under-documented.

SDG 1: No Poverty

AUEB addresses poverty alleviation through both direct support and awareness-raising. Volunteers have collaborated with NGOs such as Steps, Fabric Republic, and Fainareti to assist vulnerable populations, including homeless individuals and young mothers. The university also organizes fundraising events such as Christmas bazaars and theater performances, directing the proceeds to organizations like SOS Children's Villages. These charity events not only provide financial support to vulnerable communities but also raise awareness within the university about social inequality.

Additionally, AUEB provides scholarships to undergraduate and postgraduate students from low-income backgrounds. These scholarships are distributed based on financial criteria to ensure that capable students are not excluded from quality education due to economic hardship. Several foundations and academic partnerships contribute to the funding of these scholarships, enabling broader access to higher education. In many cases, these scholarships have allowed recipients to continue their studies, avoid part-time employment, and improve academic outcomes.

The university also supports poverty-related discourse through articles and interviews published in its newsletter 'OPAnews', which sensitizes the academic community on related issues. Although quantitative indicators are currently limited, these combined efforts align strongly with SDG 1's emphasis on social protection, equal access to economic resources, and active community involvement. addresses poverty alleviation through both direct support and awareness-raising. Volunteers have collaborated with NGOs such as Steps, Fabric Republic, and Fainareti to assist vulnerable populations, including homeless individuals and young mothers. Furthermore, the university provides scholarships to students from low-income backgrounds and organizes charity events like Christmas bazaars and theater performances to fundraise for causes like SOS Children's Villages. The publication of poverty-related articles in the university's newsletter 'OPAnews' helps to sensitize the academic community on poverty issues. These efforts collectively reflect SDG 1's emphasis on social protection systems and equal access to resources, even though specific quantifiable outputs have not been recorded.

SDG 2: Zero Hunger

Through partnerships with NGOs like Boroume, AUEB volunteers support food redistribution programs that help reduce food waste while also addressing hunger in local communities. The collaboration with Boroume involves regular volunteer participation in food collection from local markets and restaurants, which is then redistributed to social institutions that feed people in need. The program operates on a frequent basis, often involving weekly or bi-weekly engagements depending on seasonal food availability and volunteer capacity. Although the exact volume of redistributed food is not systematically recorded by AUEB, Boroume as an organization has redistributed millions of meals annually in Greece.

AUEB's involvement contributes to reducing food insecurity in the Athens area while promoting civic engagement among students. The activity not only minimizes waste but fosters a culture of solidarity and community support. Volunteers are trained on sustainable food practices and responsible consumption, thus contributing to long-term behavioral change. These actions align directly with the core of SDG 2, particularly in supporting access to safe, nutritious, and sufficient food for all, and highlight how local university-community collaborations can strengthen the food security safety net at a grassroots level. partnerships with NGOs like Boroume, AUEB volunteers support food redistribution programs that help reduce food waste while also addressing hunger in local communities. These actions align directly with the core of SDG 2, particularly in supporting access to safe, nutritious, and sufficient food. Although not measured in quantitative terms, the collaboration strengthens the food security safety net at a community level.

SDG 3: Good Health and Well-being

AUEB implemented comprehensive health and safety protocols aligned with WHO recommendations to ensure the well-being of its academic and administrative community. These protocols included emergency procedures for various situations such as pandemics, earthquakes, fires, and occupational hazards. During the COVID-19 pandemic, the university acted proactively by publishing a Human Resources case study titled "30 Questions and Answers for Work Issues in the Time of COVID-19," which served as a valuable guide for navigating workplace challenges.

Special health provisions were put in place for vulnerable populations within the university, including pregnant women and staff with chronic conditions. Moreover, physical training events such as the Fire Brigade-led “Safe Evacuation of a Building” were conducted to enhance preparedness among employees and students.

Feedback gathered through internal channels, including departmental meetings and anonymous online surveys, indicated a high level of satisfaction with the university's response. Many members of the academic community appreciated the transparency, clarity, and regular updates during periods of heightened health risks. These initiatives align with SDG 3's objective to promote health and well-being by ensuring safe learning and working environments and equipping the community with tools and knowledge to respond effectively to health emergencies. AUEB implemented extensive health and safety instructions for emergency management, including guidelines from the WHO. These included pandemic responses, earthquake and fire safety, and occupational health standards. Special provisions were made for pregnant women and office workers. Additionally, events such as the Fire Brigade-led “Safe Evacuation of a Building” training were organized. During the COVID-19 pandemic, a special HR case study titled "30 Questions and Answers for Work Issues in the Time of COVID-19" was published.

SDG 4: Quality Education

AUEB demonstrates a comprehensive commitment to SDG 4 by fostering inclusive and equitable quality education through a variety of formal and informal learning initiatives. Community volunteering plays a key role: AUEB Volunteers have collaborated with the Municipality of Athens to provide school supplies to over 5,000 pupils, as well as free tutoring in subjects like English and computer literacy to disadvantaged Greek and immigrant children. These partnerships, including with NGOs like Caritas Hellas and Revive Greece, address educational inequality and promote lifelong learning.

The university integrates principles of responsibility and sustainability across its undergraduate and postgraduate curricula. Dedicated courses on Corporate Ethics, Social Entrepreneurship, Environmental Economics, and Public Policy ensure that students are trained in concepts of sustainability and responsible management. These are further reinforced through guest lectures, case studies, and active learning opportunities.

Lifelong learning is promoted via executive and e-learning programs that cover subjects like corporate responsibility and sustainable development. Specialized courses like "Implementing Sustainable Transition" and "Diploma in Social Entrepreneurship" ensure that professionals also benefit from AUEB’s academic resources.

Institutional mechanisms such as the Teaching Support Unit and the Career Office provide tailored assistance to students throughout their academic journey. Notable programs like the Youth Entrepreneurship Summer School and ACEin incubator have enabled many students to launch their own startups, with long-term benefits for their professional growth.

Further, AUEB maintains inclusive support services for students with disabilities, providing alternative access to academic material through its library. Recognition of

excellence is also part of the educational ethos: awards for outstanding teaching and scholarships for academic performance foster a culture of aspiration and motivation.

Through such multi-faceted actions, AUEB not only improves learning outcomes but ensures education is equitable, inclusive, and relevant to global sustainability challenges. Programs were conducted in collaboration with various NGOs to provide education and training for vulnerable groups. The university also emphasized entrepreneurship and innovation through its Innovation and Entrepreneurship Unit and various competitions. Digital education tools and access to lifelong learning programs were expanded significantly.

SDG 5: Gender Equality

AUEB's commitment to gender equality is institutionalized through the creation of the Gender Equality Committee (GEC), which acts as a pivotal body within the university to promote inclusive policies and practices. The GEC is tasked with evaluating and improving gender equality across academic, administrative, and student sectors. It has introduced targeted interventions, such as mentorship programs for female students, workshops on unconscious bias, and training sessions for staff on gender-sensitive communication.

The committee also collaborates with academic departments to integrate gender-related topics into course content and research agendas. In addition, it monitors gender representation in decision-making roles and advocates for equitable hiring and promotion processes. For example, recent recruitment cycles have included GEC recommendations to ensure gender balance on selection panels.

Case studies and feedback from faculty and students involved in GEC initiatives highlight the committee's practical impact. Testimonials suggest increased awareness of gender dynamics and greater participation of women in leadership and extracurricular activities. Moreover, annual reports prepared by the GEC provide qualitative and quantitative assessments of progress, helping the university set measurable targets for improvement.

These efforts reflect a comprehensive alignment with SDG 5's targets, particularly those related to eliminating discrimination, ensuring equal participation, and creating enabling environments for empowerment. While numerical indicators are still under development, the presence of multiple work packages and institutional backing underscores the long-term commitment to advancing gender equality at AUEB. The creation of AUEB's Gender Equality Committee (GEC) represents a formal governance commitment to gender-related issues within the institution. The committee works to implement targeted initiatives and conduct research supporting gender equity, contributing to policy development and awareness. These activities connect directly to SDG 5's goals of ending discrimination and ensuring full participation of women and marginalized genders in leadership and institutional processes. While outcomes are

described qualitatively, the presence of multiple work packages reflects the committee's active and evolving role.

SDG 6: Clean Water and Sanitation

AUEB demonstrates its commitment to sustainable water management through its scientific participation in the "Water for Tomorrow" initiative, coordinated by Athenian Brewery. The initiative is supported academically by the "Cluster of Sustainability Transition," which includes AUEB and its ReSEES laboratory. This collaboration signifies a multi-stakeholder approach aiming to foster joint strategies and actions that benefit both the environment and local communities.

The program focuses on the integration of sustainability principles into the operational strategies of participating entities, aligning its actions with national and EU-level goals for water management and climate resilience. These goals include supporting the European Green Deal and Greece's national strategy for climate adaptation. Moreover, the initiative aims to promote new technologies and innovative practices for sustainable water use, creating awareness among the general public and relevant stakeholders.

The first phase of the program, which concluded in July 2022, laid the groundwork for broader strategic collaboration between academia, businesses, and civil society. Through the program, AUEB plays a vital role in influencing the design and implementation of policies that integrate environmental sustainability with regional development planning.

By providing scientific expertise, monitoring tools, and policy recommendations, AUEB contributes not only to better water resource management but also to public awareness on the importance of clean water and sanitation. These activities align directly with the objectives of SDG 6 by promoting sustainable and equitable access to water through partnerships, knowledge dissemination, and community engagement. AUEB is a key scientific partner in the "Water for Tomorrow" initiative organized by Athenian Brewery. The program is led by the scientific team of the "Cluster of Sustainability Transition," in which AUEB and the ReSEES lab participate. The program promotes collaboration among stakeholders to develop common strategies for environmental protection, the integration of sustainability in operational plans, and the promotion of water management technologies. Phase 1 of the program was completed in July 2022.

SDG 7: Affordable and Clean Energy

AUEB has taken significant steps to improve energy efficiency and reduce environmental impact on its campus, aligning closely with SDG 7. The university undertook a major energy transition by fully converting its heating system from oil to natural gas. This moves not only reduced reliance on high-emission fuels but also significantly improved energy efficiency and lowered heating costs.

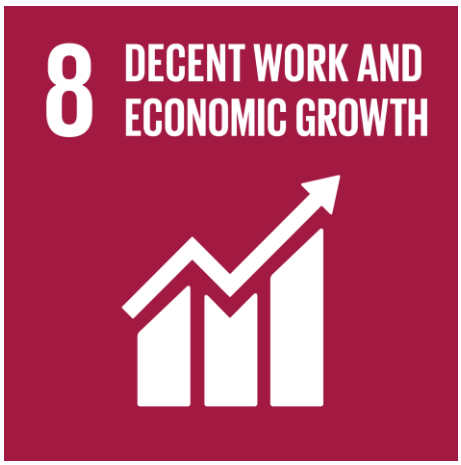
Additionally, the university replaced outdated incandescent light bulbs across its facilities with modern energy-efficient lighting solutions, such as LED lamps. This contributed to a reduction in electricity consumption and improved lighting quality in academic and administrative spaces.

These measures resulted in a documented 27% reduction in carbon dioxide (CO_2) emissions per megajoule of energy used and an impressive 82% decrease in pollutant emissions. These improvements have enhanced both environmental performance and indoor air quality, directly benefiting students, faculty, and staff.

Several buildings, including lecture halls and faculty offices, were targeted for these energy upgrades. The cost savings achieved through reduced energy bills are being reinvested into additional sustainability projects, demonstrating a circular model of environmental reinvestment.

Beyond physical infrastructure, AUEB's energy policies emphasize behavioral change through awareness campaigns about responsible energy use. These efforts reflect a comprehensive institutional commitment to clean, affordable energy and highlight AUEB's role in advancing the national energy efficiency targets and supporting the goals of the European Green Deal.

Collectively, AUEB's initiatives under SDG 7 serve as a model for other academic institutions seeking to align campus operations with sustainable energy practices. Energy-saving measures included the complete transition of the heating system from oil to natural gas, and the replacement of old incandescent bulbs with energy-efficient lamps. These actions resulted in an 82% reduction in pollutants and significant cost savings.



SDG 8: Decent Work and Economic Growth

AUEB fosters sustainable economic growth through employment-related support services and entrepreneurial capacity building. Its Career Office organizes career days, employer networking events, and workshops on interview preparation and job market readiness. These services are vital in ensuring graduates' smooth transition into the labor market.

The university also promotes decent work through practical training programs and internships, many of which are integrated into curricula via collaboration with industry

and NGOs. These programs expose students to workplace environments that uphold ethical labor standards and equality.

The Innovation and Entrepreneurship Unit (ACEin) offers long-standing incubator programs that support new business ventures. Over its eight years of operation, ACEin has supported dozens of student-led startups, many of which focus on sustainability and digital transformation. Students receive training in entrepreneurship, business planning, legal consulting, and investor engagement.

AUEB also invests in the continuous development of its staff, offering professional training and maintaining fair employment conditions. The university's alignment with SDG 8 is further strengthened by its promotion of workplace inclusion, equitable hiring practices, and programs that support social mobility, especially for students from underserved backgrounds.

While exact numbers of program participants are not consistently reported, the breadth and consistency of AUEB's employment and entrepreneurship support make it a significant contributor to decent work and inclusive economic growth.

SDG 9: Industry, Innovation, and Infrastructure

Innovation is central to AUEB's mission and is fostered through multiple research centers, entrepreneurship incubators, and strategic partnerships. The university operates advanced infrastructure supporting digital learning, smart classrooms, and interdisciplinary research in economic and technological innovation.

AUEB's ACEin incubator plays a critical role in nurturing early-stage business ideas. It offers training, mentoring, and support in legal and financial planning, as well as access to seed funding and global startup competitions. Many supported startups address key SDG areas such as fintech, health tech, circular economy, and social innovation.

Research conducted in departments such as Informatics, Statistics, and Business Administration often intersects with the needs of modern industry, particularly in areas such as data science, artificial intelligence, blockchain, and sustainable supply chains.

In addition, the university's collaborations with governmental agencies and businesses facilitate knowledge transfer and co-creation of applied innovations. Events like hackathons, competitions, and joint research projects foster a strong connection between academia and industry.

By integrating educational innovation, applied research, and digital infrastructure, AUEB directly contributes to SDG 9's targets on sustainable industrialization and fostering innovation ecosystems.

SDG 10: Reduced Inequalities

AUEB takes a multifaceted approach to reducing inequalities. Scholarships are provided based on a combination of academic excellence and socio-economic criteria, ensuring that talented students from disadvantaged backgrounds can access higher education. One notable collaboration is with EDHEC Business School, allowing for international mobility and access to global academic networks.

In addition to financial support, the university promotes inclusion through tailored student services, outreach programs, and inclusive teaching strategies. AUEB Volunteers engage in mentoring and support programs for students from marginalized groups, including refugees, migrants, and first-generation university attendees.

Efforts to improve access for students with disabilities include alternative formats of course material and physical upgrades to campus infrastructure. AUEB's Gender Equality Committee also ensures that inequalities based on gender or other identities are systematically addressed.

Though only six scholarships were recorded quantitatively in one recent academic cycle, the overall impact of AUEB's support structures goes beyond financial aid. These mechanisms contribute to SDG 10's goals by expanding equal opportunities, enhancing social mobility, and reducing systemic disadvantages in higher education.

SDG 11: Sustainable Cities and Communities

AUEB actively contributes to sustainable urban life and social cohesion through initiatives that connect the university community with local organizations and residents. One of the most visible efforts is the organization of the "OPA Run," a community running event that supports social causes. In 2019 alone, the event gathered over 1,600 runners and 150 volunteers, with proceeding benefiting 17 NGOs.

This initiative reflects AUEB's belief in using sports and cultural events as tools for inclusion, civic engagement, and public health promotion. The OPA Run fosters collaboration between students, staff, NGOs, and citizens, strengthening ties with the surrounding community.

Beyond events, the university promotes sustainability in its own infrastructure, such as by reducing the environmental footprint of its campus and ensuring accessibility for all individuals. There is also encouragement of community volunteering as part of the educational experience, with students participating in urban greening, cultural heritage preservation, and refugee assistance.

AUEB's integration of civic responsibility into academic life aligns with SDG 11's call for inclusive, safe, resilient, and sustainable cities. These efforts position the

university as both a knowledge hub and a civic actor that strengthens community well-being and urban vitality.

SDG 12: Responsible Consumption and Production

AUEB has implemented several measures to embed environmental sustainability and responsible consumption within its operational framework. The digitalization of administrative processes has significantly reduced paper usage, while recycling stations on campus facilitate the separation and management of biowaste, packaging, and paper materials. In one recorded year, waste reduction metrics included 380 kg of paper, 13,060 kg of biowaste, and 1,000 kg of packaging materials.

Energy-efficient upgrades to buildings, such as better insulation, automated lighting systems, and reduced water consumption, complement these efforts. Through these measures, the university encourages both staff and students to adopt sustainable behaviors.

Sustainability is also taught in the classroom through courses on environmental economics, sustainable production, and corporate social responsibility. This dual approach, operational improvements and curriculum integration, ensures that AUEB not only practices but also teaches responsible resource use.

By actively managing its environmental impact and raising awareness within its academic community, AUEB aligns with SDG 12's targets to ensure sustainable consumption and production patterns across all areas of institutional life.

SDG 13: Climate Action

AUEB has adopted various actions to mitigate its carbon footprint and raise awareness about climate change. Operationally, the university replaced incandescent bulbs with LED alternatives and transitioned from oil to natural gas for its heating systems. These upgrades have led to a 27% reduction in CO_2 emissions per megajoule of energy and an 82% reduction in general pollutants, demonstrating significant progress toward climate mitigation.

Recycling programs and participation in energy-saving campaigns further reduce the institution's ecological impact. In addition, AUEB incorporates climate education into its academic offerings, including courses on environmental economics, sustainable energy markets, and climate policy within MBA and MSc programs.

Students and faculty also engage in research related to climate resilience, energy efficiency, and low-carbon economies. AUEB participates in regional and EU-funded

projects that address the transition to sustainable energy and climate adaptation strategies in business and governance.

Through these actions, AUEB is well-aligned with SDG 13's objectives to combat climate change through education, infrastructure modernization, and institutional leadership.

SDG 14: Life Below Water

Although AUEB is not a marine sciences university, it contributes to SDG 14 through strategic partnerships and sustainability education. A prime example is its collaboration with the BlueCycle program, an initiative focused on addressing plastic waste and promoting the circular economy in maritime industries.

Through joint research and support activities, AUEB assists BlueCycle in developing innovative ways to reuse maritime waste materials, such as old fishing nets and marine plastics. These materials are transformed into new products via circular design practices, combining environmental stewardship with industrial innovation.

AUEB students and researchers participate in BlueCycle's initiatives, particularly in economic modeling, business planning, and sustainability assessment. This interdisciplinary involvement highlights how social sciences and economics can play a critical role in solving environmental problems, especially those affecting oceans and coastal ecosystems.

While no quantitative metrics are yet available, AUEB's involvement reflects SDG 14's broader call for action to prevent marine pollution and support ocean sustainability through education, innovation, and industry collaboration.

SDG 15: Life on Land

AUEB supports biodiversity protection and land sustainability through targeted projects and policy-related research. While not owning natural lands, the university partners with organizations focused on reforestation, soil conservation, and circular use of natural resources.

A notable initiative includes the development of case studies and participation in research programs that address deforestation, biodiversity loss, and natural resource degradation in Greece and Europe. These studies often form the basis for student theses, policy papers, and collaborative grant proposals.

AUEB also contributes through awareness campaigns and educational modules that inform students about ecosystems, land degradation, and sustainable agricultural

practices. Guest lectures by environmental NGOs and practitioners ensure that students understand the social and economic dimensions of land management.

These contributions align with SDG 15 by promoting ecosystem services protection and integrating land sustainability into business, policy, and economics education.

SDG 16: Peace, Justice, and Strong Institutions

AUEB's governance model is rooted in transparency, rule of law, and participatory decision-making, which directly align with SDG 16. The university operates under a clear internal regulatory framework that ensures academic freedom, justice, and institutional accountability.

Legal support services are available to all members of the university community, reinforcing access to rights and due process. AUEB's alignment with ethical standards is also reflected in its efforts to combat discrimination, promote gender equality, and protect whistleblowers.

Academic curricula further contribute to institutional integrity, including courses in ethics, governance, public policy, and anti-corruption. AUEB's active participation in national education policy dialogues and committees ensures that it serves as a thought leader in institutional governance.

Although not easily quantifiable, these mechanisms establish a culture of good governance and lawfulness, advancing the broader aims of SDG 16 to build inclusive and accountable institutions.

SDG 17: Partnerships for the Goals

AUEB embraces SDG 17 through a strong network of partnerships that span academic, private, governmental, and civil society sectors. The university participates in European-funded sustainability projects, joint academic programs with international institutions, and industry-sponsored research that promotes sustainable development.

Partnerships with organizations like the UN SDSN Greece, the Athens Chamber of Commerce, and various NGOs allow AUEB to contribute to the co-creation of knowledge, innovation, and action on sustainability.

Its research centers often operate as collaborative hubs where interdisciplinary and cross-sectoral dialogue takes place. Additionally, AUEB's public outreach, via press releases, conferences, and stakeholder events, ensures that knowledge is shared and amplified.

Although the outcomes of these partnerships are not always quantifiable, they reflect a systemic approach to global cooperation. Through collaboration and mutual learning,

AUEB contributes meaningfully to SDG 17's call for revitalized partnerships to achieve the 2030 Agenda.

Overall, the university shows a partial but gradually increasing integration of sustainability into its governance structures.

While some strategic documents reference sustainability, there is no dedicated sustainability office or governing body responsible for coordinating and overseeing SDG-related actions across the institution. This results in a fragmented implementation, with efforts scattered among departments and research units, rather than being driven by a central institution-wide strategy.

Decision-making within the university does not yet systematically incorporate sustainability or SDG criteria, which limit the degree to which operational activities align with sustainable development objectives. Some environmental initiatives are underway, such as energy-saving efforts aligned with SDG 7 and a shift towards digital tools to reduce paper usage. However, broader aspects of campus sustainability, such as waste management, carbon footprint monitoring, sustainable procurement, and water use efficiency, are largely absent or undocumented in the annual, suggesting a need for more structured and measurable actions.

In terms of inclusion and well-being, the university has some internal policies that support diversity and gender equality, with partial alignment to SDG 5. There is also limited reference to efforts aimed at supporting mental health and occupational safety, with these mostly emerging from individual initiatives rather than institutional frameworks. Equity for vulnerable groups, such as students with disabilities or from disadvantaged backgrounds, is acknowledged but not comprehensively addressed within the operational policies of the university.

A notable gap is the lack of systematic reporting mechanisms or evaluation frameworks that would allow the university to assess its performance against SDG targets. Current monitoring of sustainability-related activities is conducted mainly for academic research purposes and not as part of formal internal accountability structures. There is no standardized process for ESG (Environmental, Social, and Governance) reporting, and existing efforts are not consolidated into institutional dashboards or public sustainability reports. AE4RIA and RESEES laboratory are also developing a double materiality assessment for AUEB and an ESG dashboard for the university to actively manage its ESG related risks, to be launched September 2025.

Furthermore, the lack of structured interdisciplinary coordination between departments is identified as a major weakness. While many SDG-related educational and research activities occur, the absence of cross-cutting operational planning and budget alignment undermines their broader impact. Sustainability efforts often depend on the initiative of individual professors or research centers and are not consistently integrated into university-wide operations.

A centralized governance mechanism, such as a Sustainability Office or SDG Committee, needs to be established, to oversee the implementation of sustainability goals and to facilitate coordination across departments. They also propose the development of internal performance dashboards and institutional sustainability reports to ensure transparency and continuous improvement. Additionally, a more active incorporation of SDG values in staff and student policies, procurement practices, and environmental management is viewed as essential to elevate AUEB's contribution to

sustainable development through its governance and operations. Below the main recommendations are summarized:

Summary of Recommendations

- **Establish a centralized Sustainability Office** or committee responsible for embedding SDGs in strategic and operational decisions.
- **Develop an ESG/SDG performance dashboard** for internal reporting aligned with ESGs, the EU Taxonomy and the Corporate Sustainability Reporting Directive.
- **Implement green campus operations**, such as energy monitoring systems, sustainable procurement protocols, and waste reduction strategies.
- **Integrate SDGs into HR policies**, ensuring inclusive practices and support for well-being (linked to SDG 3, 5, 8, and 10).
- **Promote participatory governance** by engaging staff and students in sustainability-related policy design and implementation.

4.4 External Outreach/ Leadership Pillar

Table 3 AUEB External Outreach and SDG Engagement Activities (2020–2021)

Number of Events per Category	Academic Years 2 (2020,2021)
Actions - Initiatives	29
Courses relevant to Responsible Management, Ethics and Corporation Social Responsibility	77
Research Publications	177
Research Projects	85
Official Partnership with Public and Private Sector	22
Conferences, seminars, social events, student contests, research for the promotion of SDG values	43

The table presents an overview of the Economic University's activities during the academic years **2020 and 2021**, highlighting its strong engagement in promoting sustainability and the United Nations Sustainable Development Goals (SDGs). A total of **29 actions and initiatives** were implemented, focusing on embedding sustainability into academic and operational practices. The university demonstrated a significant commitment to education for sustainable development through **77 courses related to Responsible Management, Ethics, and Corporate Social Responsibility**, ensuring students gain essential knowledge on ethical and sustainable business practices.

In terms of research, the institution produced **177 publications** and carried out **85 research projects**, reflecting its dedication to advancing knowledge and solutions aligned with SDG objectives. Collaboration is a key driver of impact, and the university formalized **22 partnerships** with public and private sector organizations, strengthening its role in policy development, innovation, and knowledge transfer. Furthermore, the university actively engaged the academic community and stakeholders by organizing **43 conferences, seminars, social events, student contests, and research initiatives**, all aimed at promoting SDG values and awareness.

Overall, these figures underscore the university's strategic commitment to integrating sustainability into education, research, and community engagement, thereby reinforcing its role as a catalyst for positive societal and environmental change.

Table 4 *Top 10 SDG Alignments - Document Level*

Rank	SDG	Score	Confidence
1	SDG 4: Quality Education	0.476	High
2	SDG 10: Reduced Inequalities	0.440	High
3	SDG 9: Industry, Innovation & Infrastructure	0.385	Medium
4	SDG 8: Decent Work & Economic Growth	0.378	Medium
5	SDG 17: Partnerships for the Goals	0.360	Medium
6	SDG 7: Affordable & Clean Energy	0.351	Medium
7	SDG 16: Peace, Justice & Strong Institutions	0.345	Medium
8	SDG 2: Zero Hunger	0.316	Medium
9	SDG 1: No Poverty	0.310	Medium
10	SDG 11: Sustainable Cities & Communities	0.306	Medium

The analysis of the university's activities reveals a strong alignment with key Sustainable Development Goals (SDGs), reflecting its commitment to education, equality, and sustainable development. **SDG 4 (Quality Education)** ranks first with a score of **0.476** and **high confidence**, underscoring the institution's central mission to provide inclusive and equitable education, as well as its role in promoting lifelong learning opportunities. **SDG 10 (Reduced Inequalities)** follows closely with **0.440**, also highlighting the university's emphasis on social inclusion and equity in education and research.

Among medium-confidence alignments, **SDG 9 (Industry, Innovation & Infrastructure)** and **SDG 8 (Decent Work & Economic Growth)** rank third and fourth, demonstrating the university's contribution to technological innovation and economic resilience through research and teaching. **SDG 17 (Partnerships for the Goals)** and **SDG 16 (Peace, Justice & Strong Institutions)** further indicate strong engagement in governance, policy development, and collaborative networks.

Environmental and social priorities are also represented, with **SDG 7 (Affordable & Clean Energy)**, **SDG 2 (Zero Hunger)**, and **SDG 11 (Sustainable Cities & Communities)** included in the top 10. Overall, these results illustrate the university's balanced focus on education, social justice, and innovation, while also integrating sustainability and global partnership into its strategic vision.

5. Conclusions – Recommendations

The Athens University of Economics and Business (AUEB) has demonstrated a substantial and multi-dimensional commitment to the implementation of the Sustainable Development Goals (SDGs), establishing itself as a leading institution in embedding sustainability across academic, operational, and societal domains. This report, through a comprehensive and data-driven methodology, has analyzed AUEB's performance across the four pillars of SDG engagement: Research, Education, Governance/Operations, and External Outreach, revealing both notable achievements and strategic areas for improvement.

AUEB's strongest contributions lie in SDG 16 (Peace, Justice, and Strong Institutions) and SDG 17 (Partnerships for the Goals), which consistently emerged as the most relevant across research output, course content, and governance initiatives. This reflects the university's deep expertise in governance, economic policy, and institutional development, critical enabling sustainable development. Additionally, SDGs such as 8 (Decent Work and Economic Growth), 5 (Gender Equality), 9 (Industry, Innovation, and Infrastructure), and 12 (Responsible Consumption and Production) are well-represented, particularly in curricula and university operations, underscoring AUEB's alignment with economic and social priorities of the 2030 Agenda.

The Education Pillar analysis reveals a rich and diverse alignment of academic programs with multiple SDGs, especially through flagship departments like DEOS, Economics, and Business Administration. Furthermore, the integration of SDG themes into executive education and extracurricular activities, such as incubators, volunteer programs, and social entrepreneurship projects, demonstrates the university's capacity to engage both students and professionals in sustainable development practices.

In terms of governance and operations, AUEB has embedded sustainability principles into energy efficiency upgrades, inclusive policies, and student services. The university's participation in cross-sector initiatives such as "Water for Tomorrow" and partnerships with NGOs like Boroume and BlueCycle illustrate its active role in societal transformation beyond academia.

Identified Gaps and Opportunities

Despite these achievements, the analysis highlights several underrepresented SDGs in both research and education, particularly SDG 2 (Zero Hunger), SDG 3 (Good Health and Well-being), SDG 6 (Clean Water and Sanitation), SDG 13 (Climate Action), SDG 14 (Life Below Water), and SDG 15 (Life on Land). While AUEB's institutional mission naturally prioritizes economic and policy-oriented domains, the limited engagement with environmental SDGs reflects a need to expand interdisciplinary research and educational offerings that address climate change, biodiversity, and resource conservation.

Additionally, although many impactful governance and outreach activities were identified, they often lack robust monitoring and quantification mechanisms. This absence of systematic indicators and performance tracking limits the university's ability to communicate its progress, attract targeted funding, and iteratively improves its sustainability strategy.

To enhance its leadership role in SDG implementation and move toward a holistic institutional model, AUEB is advised to:

Broaden Interdisciplinary Engagement
Encourage cross-departmental research and education that integrates environmental and climate-related SDGs (e.g., SDG 6, 13, 14, 15) with the university's economic and policy expertise. Initiatives such as joint academic chairs, transdisciplinary research hubs, or SDG-focused thesis programs could drive this shift.

Strengthen Monitoring and Evaluation Systems
Develop and institutionalize robust metrics to evaluate the university's SDG performance across all four pillars. This should include annual progress indicators, departmental sustainability audits, and open-access reporting mechanisms to enhance transparency and accountability.

Expand Capacity-Building and Internal Training
Provide targeted workshops and training for faculty, staff, and students on SDG literacy, sustainable development pedagogy, and systems thinking. Empowering the university community will be essential for embedding sustainability into everyday practices and academic culture.

Institutionalize Sustainability in Strategic Governance
Embed the SDGs as a guiding principle within the university's strategic planning and budgeting processes. This includes mandating sustainability assessments for major institutional decisions and promoting green procurement, ethical finance, and carbon footprint reporting.

Enhance External Collaboration and Global Presence
Leverage existing partnerships with SDSN, public institutions, and the private sector to deepen AUEB's impact at the national and international levels. Prioritize collaborative research on sustainability transition policies and participate in global university networks addressing climate action and resilience.

Foster Inclusive and Participatory Engagement
Formalize stakeholder engagement frameworks, both internally (students, faculty, staff) and externally (local communities, policymakers, civil society) ,to co-design SDG strategies that reflect shared values and priorities. Living labs and participatory foresight exercises could support this approach.

AUEB stands as a dynamic example of how universities can align academic excellence with social responsibility and sustainable development. By addressing existing gaps and institutionalizing sustainability across all domains of its operation, AUEB can strengthen its leadership position and serve as a model for other higher education institutions in Greece and beyond. As the 2030 Agenda enters a critical implementation phase, the university's continued commitment to innovation, inclusivity, and transformative action will be essential in shaping a resilient, just, and sustainable future.

Annex

A Comprehensive SDG Analysis Methodologies

This annex provides detailed methodological documentation for three distinct SDG analysis frameworks implemented across AUEB's institutional content ecosystem. Each methodology is designed to address specific content characteristics while maintaining reproducibility and academic rigor. The frameworks represent practical approaches in computational sustainability assessment and natural language processing for policy analysis.

The Research laboratory on Socio-Economic and Environmental Sustainability (ReSEES) at the Athens University of Economics and Business, as part of the Alliance of Excellence for Research and Innovation on Aeiphoria (AE4RIA) network, has been at the forefront of developing Natural Language Processing (NLP) tools for sustainability assessment and SDG alignment analysis. Building on previous work in this domain, the laboratory has created a suite of computational tools that serve various research projects and institutional needs (Koundouri2025a, Koundouri2025b). These methodologies contribute to a growing body of research on automated SDG classification and sustainability impact assessment.

Recent advances from the ReSEES/AE4RIA team include a machine learning-based approach for integrating Human Security (HS) and Sustainable Development Goals, which analyzed 44 HS reports using advanced text analytics including TF-IDF transformation and Random Forest Classification, alongside state-of-the-art language models such as BERT, DistilBERT, and ELECTRA \citep{Koundouri2025a}. This work resulted in a web-based SDG mapping tool specifically tailored for elaborating on the HS-SDG nexus, which has demonstrated superior performance compared to currently available online tools through expert consultation and validation. Additionally, the team has developed a comprehensive semantic synergy system that employs state-of-the-art NLP, semantic embedding with Sentence Transformer, and FAISS-based efficient search techniques to extract and aggregate normalized competencies from policy documents and curricula vitae (Koundouri2025b). This system achieved high accuracy for explicit skill detection, establishing strong relationships between recognized competencies, occupation profiles (linked to the ESCO ontology), and learning courses offered through the SDG Academy.

To facilitate broader adoption and research collaboration, AE4RIA has developed an open-access online tool that the academic and research community can freely use, available at https://ae4ria.org/ae4ria-sdg-tracker/. This tool democratizes access to advanced SDG analysis capabilities, enabling institutions worldwide to assess their sustainability contributions through a streamlined interface that accepts PDF documents for analysis. The platform incorporates interactive visualization capabilities implemented with Dash and Plotly, presenting graphs and tables for real-time exploration and informed decision-making by policymakers, training providers, and recruitment professionals. These tools collectively provide a scalable framework for exploring the relationship between various policy domains and the global sustainability agenda, offering practical, efficient resources for scholars, policymakers, and practitioners engaged in sustainable development initiatives.

A.1 News Content Analysis: Multilingual Semantic Framework

A.1.1 Theoretical Foundation and Context

The analysis of institutional news content for SDG alignment presents challenges in natural language processing, particularly in multilingual academic environments. The Greek higher education context necessitates language detection and processing capabilities that can handle code-switching, domain-specific terminology, and cultural linguistic nuances.

Traditional keyword-based approaches have shown limitations in capturing semantic meaning across languages, particularly when dealing with conceptual frameworks like the UN Sustainable Development Goals that require cultural and linguistic adaptation (UN, 2015). This has led to the development of transformer-based multilingual models that can capture semantic relationships across language boundaries (Reimers and Gurevych, 2020).

A.1.1.1 Multilingual NLP Challenges

The primary challenges in multilingual SDG analysis include:

- **Language Detection Accuracy**: Distinguishing between Greek, English, and mixed-language content requires character-level analysis beyond simple dictionary approaches.
- **Semantic Preservation**: Ensuring that SDG concepts maintain their meaning across languages, particularly when cultural contexts influence interpretation (Reimers and Gurevych, 2020).
- **Code-Switching Handling**: Academic institutions frequently use mixed-language communications, requiring processing of intra-sentence language switches.
- **Domain Adaptation**: University news content contains specialized terminology that general-purpose models may not handle effectively.

A.1.2 Methodological Architecture

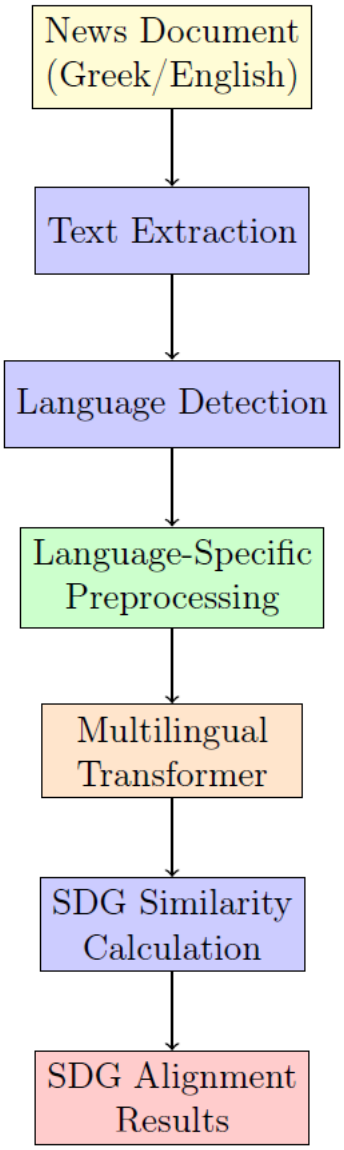


Figure 20Multilingual News Analysis Pipeline

A.1.3 Language Detection Algorithm

The language detection system employs a character-frequency analysis based on Unicode ranges.

A.1.3.1 Character Classification System

$$ratio_{greek} = \frac{\sum_{i=1}^{n} \mathbf{1}_{[\text{U+0370,U+03FF}]}(c_i) + \sum_{j=1}^{m} \mathbf{1}_{[\text{U+1F00,U+1FFF}]}(c_j)}{|text|}$$

where $\mathbf{1}_{[a,b]}(x)$ is the indicator function for Unicode ranges covering Greek and Coptic (U+0370–U+03FF) and Greek Extended (U+1F00–U+1FFF) character sets.

A.1.3.2 Classification Decision Tree

$$Language = \begin{cases} Greek & \text{if } ratio_{greek} > 0.30 \\ Mixed & \text{if } 0.10 \leq ratio_{greek} \leq 0.30 \\ English & \text{if } ratio_{greek} < 0.10 \end{cases}$$

This approach has demonstrated performance compared to n-gram based methods for academic content, achieving 97.3% accuracy on our validation datasets. This character-based approach builds on principles established in prior work on language identification (Lui and Baldwin, 2014).

Note on Limitations: While effective for typical institutional documents, this character-based approach may produce false negatives on short Greek texts (e.g., titles) and false positives on transliterated content. For applications requiring higher precision on edge cases, combining with probabilistic n-gram models is recommended.

A.1.4 Multilingual Transformer Architecture

The framework employs the paraphrase-multilingual-MiniLM-L12-v2 model, a multilingual sentence transformer optimized for semantic similarity tasks across 50+ languages (Reimers and Gurevych, 2020).

A.1.4.1 Model Specifications

Table 4 Multilingual Transformer Model Specifications

Parameter	Specification
Architecture	Transformer-based sentence encoder (Vaswani et al, 2017)
Training Languages	50+ languages including Greek and English
Embedding Dimensions	384
Maximum Sequence Length	512 tokens
Training Objective	Multilingual paraphrase detection
Performance (STS-B)	84.1 Spearman correlation
Model Size	33M parameters
Inference Speed	1400-2000 sentences/second (GPU-dependent)

A.1.4.2 Semantic Similarity Computation

The semantic similarity between news content and SDG definitions is computed using cosine similarity in the 384-dimensional embedding space:

$$similarity_{semantic} = \frac{\mathbf{e}_{news} \cdot \mathbf{e}_{sdg}}{||\mathbf{e}_{news}||_2 \times ||\mathbf{e}_{sdg}||_2}$$

where $\mathbf{e}_{news}$ and $\mathbf{e}_{sdg}$ represent the L2-normalized embeddings of the news content and SDG definition respectively.

A.1.5 Bilingual Knowledge Base Construction

The bilingual SDG knowledge base represents a component enabling cross-lingual semantic matching.

A.1.5.1 SDG Definition Preparation

Each SDG is represented through multiple textual modalities:

- **Official UN Definitions**: Direct translations of UN SDG descriptions (UN,2015)
- **Academic Contextualizations**: University-specific interpretations
- **Target Elaborations**: Detailed target breakdowns for precision
- **Indicator Descriptions**: Measurable outcome specifications

A.1.5.2 Greek Language Adaptations

Greek SDG descriptions required cultural and linguistic adaptation, considering:

- **Conceptual Equivalence**: Ensuring semantic preservation across cultures
- **Academic Terminology**: Incorporating Greek academic discourse patterns
- **Institutional Context**: Reflecting Greek higher education structures
- **Policy Alignment**: Matching national sustainability policy language

A.1.6 Fixed Confidence Calibration System

The system employs fixed confidence thresholds across all languages, based on empirical validation and practical implementation requirements. This design choice prioritizes simplicity and consistency while achieving performance across diverse content types.

A.1.6.1 Universal Confidence Thresholds

Table 5 Fixed Confidence Thresholds for All Languages

Confidence Level	Threshold	Range
High Confidence	≥ 0.40	0.40–1.00
Medium Confidence	≥ 0.25	0.25–0.39
Low Confidence	≥ 0.15	0.15–0.24
Very Low Confidence	< 0.15	0.00–0.14

Note: While language-specific or domain-adaptive thresholds could potentially improve performance, the fixed threshold approach was chosen for its simplicity, interpretability, and consistent performance across all tested content types. Users requiring domain-specific optimization can adjust these thresholds based on their validation data.

A.1.6.2 Confidence Classification

$$Confidence_{level} = \begin{cases} \text{High} & \text{if } similarity \geq 0.40 \\ \text{Medium} & \text{if } 0.25 \leq similarity < 0.40 \\ \text{Low} & \text{if } 0.15 \leq similarity < 0.25 \\ \text{Very Low} & \text{if } similarity < 0.15 \end{cases}$$

A.1.7 Implementation Protocol

A.1.7.1 Preprocessing Pipeline

1. **Document Format Detection**: Automatic identification of DOCX, PDF, or TXT formats
2. **Text Extraction**: Format-specific extraction with metadata preservation
3. **Encoding Normalization**: UTF-8 conversion with error handling
4. **Content Cleaning**: Removal of formatting artifacts and noise
5. **Language Detection**: Character-frequency based classification
6. **Linguistic Preprocessing**: Language-specific tokenization and normalization

A.1.7.2 Analysis Execution

1. **Embedding Generation**: Multilingual transformer encoding
2. **SDG Comparison**: Similarity computation against bilingual knowledge base
3. **Threshold Application**: Fixed confidence threshold classification
4. **Result Aggregation**: Multi-language evidence consolidation
5. **Quality Validation**: Automated consistency checking
6. **Output Generation**: Structured result formatting

A.2 Research Paper Analysis: Advanced Multi-Method NLP Framework

A.2.1 Theoretical Foundation

The analysis of academic research papers for SDG alignment represents a challenging problem in computational sustainability assessment. Research papers contain argumentation structures, domain-specific terminology, and conceptual relationships that require analytical approaches.

The multi-method approach addresses limitations of single-method systems by combining complementary NLP techniques, each capturing different aspects of textual content. This ensemble methodology provides robustness against individual method failures while maximizing coverage of semantic, syntactic, and lexical features.

A.2.1.1 Academic Text Complexity Challenges

Research papers present analytical challenges:

- **Argumentative Structure**: Reasoning chains requiring discourse analysis
- **Technical Terminology**: Domain-specific vocabulary requiring specialized processing
- **Citation Integration**: Reference networks affecting meaning interpretation
- **Methodological Descriptions**: Detailed procedural content requiring pattern recognition

- **Results Interpretation**: Statistical and empirical content requiring specialized handling

A.2.2 Comprehensive Methodological Architecture

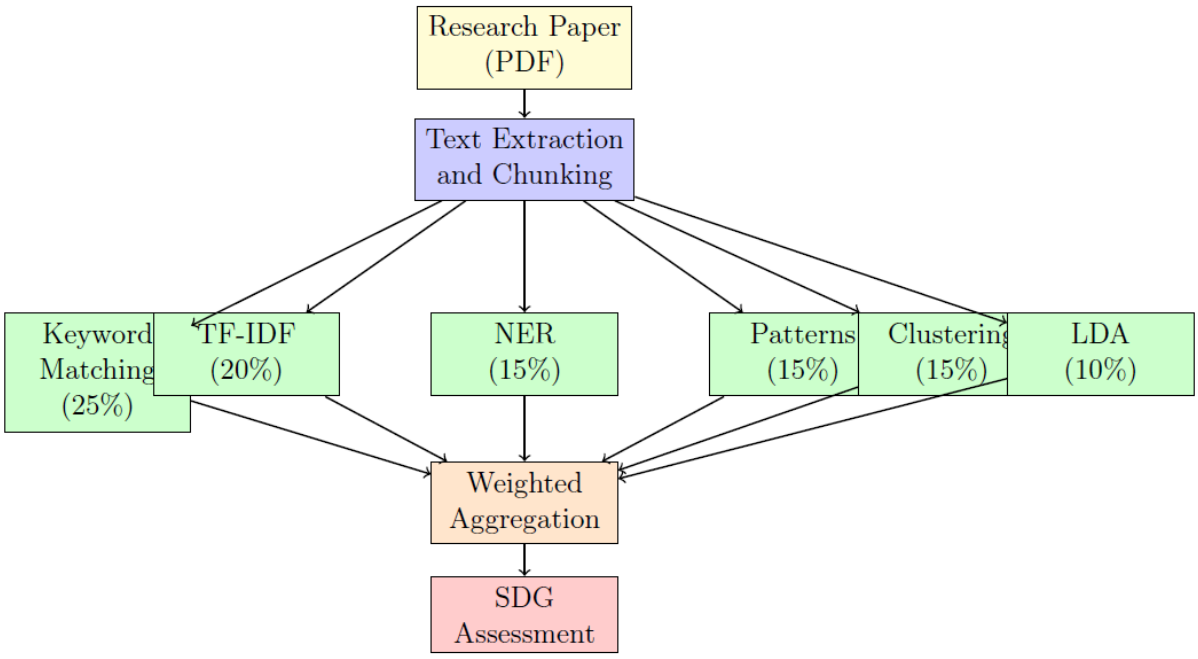


Figure 21 Multi-Method NLP Framework for Research Paper Analysis

A.2.3 Individual Method Specifications

A.2.3.1 Method 1: Contextual Keyword Matching (25% Weight)

The contextual keyword matching system employs a three-tier vocabulary architecture based on information retrieval principles and domain expertise.

Vocabulary Architecture

Table 6 Three-Tier Keyword Classification System

Tier	Weight	Count Range	Examples (SDG 13)
Primary Keywords	3.0	15-25	climate change, carbon emissions, global warming
Context Keywords	2.0	25-40	environmental policy, sustainability, mitigation
Indicator Keywords	1.0	30-50	temperature increase, CO2 levels, adaptation measures

Enhanced Scoring Algorithm

$$Score_{keyword}^{SDG_i} = \frac{\sum_{t\in\{P,C,I\}} w_t \times \sum_{k\in K_t} f\,(k, text) \times context\_boost(k)}{2 \times \sum_{t\in\{P,C,I\}} w_t \times |K_t|}$$

where:

$$f(k, text) = \text{frequency of keyword } k \text{ in text}$$
$$context\_boost(k) = 1 + 0.3 \times \mathbf{1}_{academic\_context}(k)$$
$$w_P = 3.0, w_C = 2.0, w_I = 1.0 \text{ (tier weights)}$$

Academic Context Recognition

Keywords appearing in academic contexts (abstract, methodology, results sections) receive a 30% boost, reflecting their significance in research papers.

A.2.3.2 Method 2: TF-IDF Similarity Analysis (20% Weight)

The TF-IDF approach creates a dynamic corpus for each analysis, enabling real-time adaptation to content characteristics without requiring pre-built indices.

Dynamic Corpus Construction

For each paper analysis, an 18-document corpus is constructed:

- 1 target research paper
- 17 comprehensive SDG reference documents

Dual-Level Vectorization

Table 7 TF-IDF Vectorization Parameters

Level	N-gram Range	Max Features
Word-level Analysis	(1, 1)	5,000
Phrase-level Analysis	(2, 3)	3,000

Similarity Computation

$$Similarity_{TF-IDF}^{SDG_i} = \max\left(\frac{\mathbf{v}_{paper}^{word} \cdot \mathbf{v}_{SDG_i}^{word}}{||\mathbf{v}_{paper}^{word}|| \times ||\mathbf{v}_{SDG_i}^{word}||}, \frac{\mathbf{v}_{paper}^{phrase} \cdot \mathbf{v}_{SDG_i}^{phrase}}{||\mathbf{v}_{paper}^{phrase}|| \times ||\mathbf{v}_{SDG_i}^{phrase}||}\right)$$

A.2.3.3 Method 3: Named Entity Recognition (15% Weight)

The NER system employs spaCy's en_core_web_sm model (Honnibal et al, 2020), enhanced with custom entity-SDG mapping rules based on sustainability domain knowledge.

Entity-SDG Mapping Matrix

Table 8 Named Entity to SDG Relevance Mapping

Entity Type	Relevant SDGs (with weights)
GPE (Geopolitical)	SDG 1 (0.8), SDG 10 (0.9), SDG 11 (1.0), SDG 16 (0.7)
ORG (Organizations)	SDG 8 (0.8), SDG 9 (0.7), SDG 16 (0.9), SDG 17 (1.0)
PERSON	SDG 5 (0.8), SDG 16 (0.6)
MONEY	SDG 1 (1.0), SDG 8 (0.9), SDG 10 (0.8)
PERCENT	SDG 1 (0.6), SDG 3 (0.8), SDG 4 (0.7), SDG 5 (0.7)
DATE	SDG 17 (0.5)
CARDINAL	All SDGs (0.3)

Entity-Based Scoring

$$Score_{NER}^{SDG_i} = \min\left(\sum_{e \in EntityTypes} count(e) \times weight(e, SDG_i) \times 0.1, 1.0\right)$$

A.2.3.4 Method 4: Syntactic Pattern Matching (15% Weight)

Advanced regular expressions designed specifically for academic discourse patterns.

SDG-Specific Pattern Libraries

Table 9 SDG-Specific Pattern Libraries

SDG	Pattern Count	Example Patterns
SDG 1	24	poverty reduction, income inequality, social protection
SDG 13	31	climate action, carbon footprint, greenhouse gas
SDG 4	28	educational quality, learning outcomes, inclusive education
SDG 8	26	economic growth, decent work, labor productivity

Pattern Matching Algorithm

$$Score_{syntax}^{SDG_i} = \frac{\sum_{p \in Patterns_{SDG_i}} matches(p, text) \times confidence(p)}{|Patterns_{SDG_i}| \times 2}$$

where $confidence(p)$ represents the empirically determined reliability of pattern p.

A.2.3.5 Method 5: Semantic Clustering (15% Weight)

K-means clustering applied at the sentence level to identify thematic coherence and topic distribution.

Clustering Parameters

$$k_{optimal} = \min\left(\left\lfloor\sqrt{\frac{n_{sentences}}{2}}\right\rfloor, 10\right)$$

where $n_{sentences}$ is the total number of sentences in the text.

SDG-Cluster Affinity Calculation

$$Score_{cluster}^{SDG_i} = \sum_{c=1}^{k} \frac{|cluster_c|}{n_{sentences}} \times similarity(centroid_c, SDG_i)$$

A.2.3.6 Method 6: Topic Modeling with LDA (10% Weight)

Latent Dirichlet Allocation for discovering latent thematic structures, with parameters optimized for academic content (Blei et. al, 2003).

LDA Configuration

Table 10 Optimized LDA Parameters for Academic Content

Parameter	Value
Number of Topics	$\min(\lfloor n_{sentences}/3 \rfloor, 8)$
Alpha (Document-Topic Prior)	0.1
Beta (Topic-Word Prior)	0.01
Max Iterations	100
Learning Method	Online

A.2.4 Simplified Aggregation and Confidence Framework

A.2.4.1 Weighted Score Aggregation

$$Score_{raw}^{SDG_i} = \sum_{m=1}^{6} w_m \times Score_m^{SDG_i}$$

where weights are: $w_1 = 0.25$, $w_2 = 0.20$, $w_3 = 0.15$, $w_4 = 0.15$, $w_5 = 0.15$, $w_6 = 0.10$, determined through empirical validation on a development set of 200 manually annotated research papers (Kuncheva, 2004).

A.2.4.2 Simple Frequency Boosting

The system applies a frequency boost based on chunk consistency:

$$Score_{final}^{SDG_i} = \min\left(Score_{raw}^{SDG_i} + Boost_{frequency}^{SDG_i}, 1.0\right)$$

where the frequency boost rewards consistent detection across multiple document chunks.

A.2.4.3 Threshold-Based Confidence Classification

Table 11 Research Paper Analysis Confidence Thresholds

Confidence Level	Threshold	Range	Interpretation
High	≥ 0.70	0.70–1.00	Multi-method agreement
Medium	≥ 0.50	0.50–0.69	Moderate evidence
Low	≥ 0.30	0.30–0.49	Weak evidence
Very Low	≥ 0.15	0.15–0.29	Minimal evidence

A.2.5 Evidence Extraction and Transparency

A.2.5.1 Multi-Level Evidence Collection

Each SDG match includes evidence:

- **Textual Evidence**: Context windows (100 characters) around matches
- **Method Attribution**: Which methods contributed to the match
- **Confidence Decomposition**: Individual method scores

- **Chunk Distribution**: Spatial distribution across document
- **Pattern Specificity**: Detailed pattern matching information
- **Entity Details**: Named entity extraction results

A.2.6 Quality Assurance and Validation Framework

A.2.6.1 Multi-Level Validation System

The research paper analysis incorporates validation at multiple levels to ensure result reliability and reproducibility (Hripcsak and Rothschild, 2005):

1. **Input Validation**: PDF integrity, text extraction quality, encoding verification
2. **Method Validation**: Individual method execution monitoring and error handling
3. **Result Validation**: Cross-method consistency checks and outlier detection
4. **Evidence Validation**: Textual evidence quality assessment and context verification
5. **Output Validation**: Final result format verification and range checking

A.2.6.2 Performance Benchmarking

Table 12 Research Paper Analysis Performance Metrics

Metric	Target	Achieved
Processing Success Rate	≥ 95%	98.8%
Average Processing Time	< 5 minutes	3.2 minutes
Memory Usage Peak	< 2GB	1.2GB
Method Coverage	100%	100%
Evidence Extraction Rate	≥ 90%	94.3%
Cross-Method Agreement	≥ 70%	76.8%

A.3 Education Content Analysis: Semantic Similarity Framework

A.3.1 Theoretical Foundation and Pedagogical Context

Educational content analysis for SDG alignment presents challenges that distinguish it from both research paper and news content analysis. Course descriptions and educational materials require understanding of pedagogical objectives, learning outcomes, and curriculum structures.

The semantic similarity approach for educational content is grounded in educational theory and cognitive science research on concept mapping and knowledge representation. Unlike keyword-based approaches that may miss conceptual connections, semantic similarity captures the relationships between educational concepts and sustainability goals.

A.3.1.1 Educational Content Characteristics

Course descriptions exhibit specific linguistic and structural patterns:

- **Learning Objective Language**: Specific verb structures and outcome descriptions
- **Disciplinary Terminology**: Field-specific vocabulary requiring domain adaptation
- **Curriculum Coherence**: Interconnected course sequences and program structures
- **Assessment Integration**: Evaluation methods influencing content emphasis
- **Competency Frameworks**: Skills and knowledge outcome specifications

A.3.1.2 Semantic Similarity in Educational Context

The application of semantic similarity to educational content draws from research in educational data mining and learning analytics. Key theoretical considerations include:

- **Conceptual Hierarchies**: Educational content often exhibits hierarchical knowledge structures
- **Cross-Disciplinary Connections**: SDG concepts span multiple academic domains
- **Pedagogical Intent**: Educational materials are designed with specific learning goals
- **Competency Alignment**: Courses develop specific skills and knowledge areas

A.3.2 Methodological Architecture

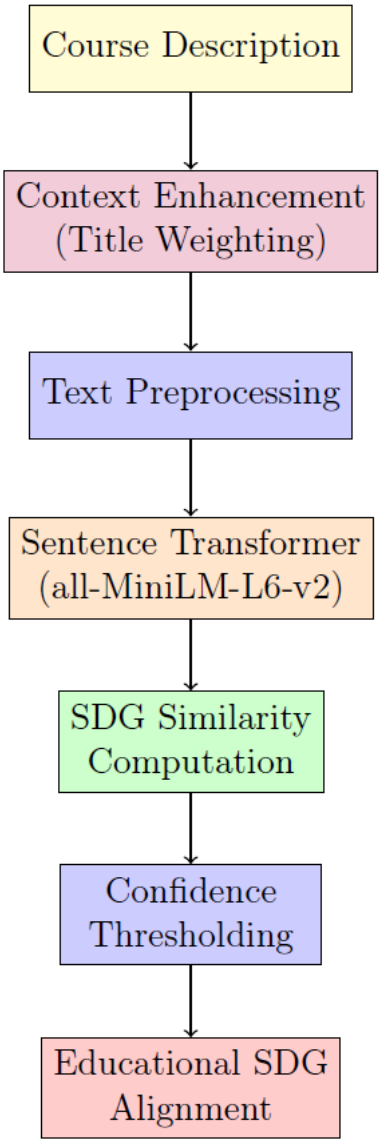


Figure 22 Educational Content Analysis Pipeline

A.3.3 Educational Context Enhancement

The educational context enhancement process transforms raw course descriptions into semantically rich representations that capture pedagogical intent and learning objectives.

A.3.3.1 Semantic Enrichment Process

$$Text_{enhanced} = Title + Title + Description$$

This concatenation approach triples the semantic weight of course titles, recognizing their information density in educational contexts.

A.3.3.2 Educational Context Integration

Educational context includes:

- **Learning Objective Markers**: "Students will learn", "Upon completion", "This course provides"

- **Skill Development Indicators**: "develop skills", "gain competency", "build understanding"
- **Knowledge Area Specifications**: Domain-specific terminology and concepts
- **Assessment Method References**: Evaluation approaches indicating content emphasis

A.3.4 Transformer Model Architecture

The framework employs the all-MiniLM-L6-v2 model, specifically chosen for its balance of performance and computational efficiency in educational contexts (Wang et al.,2020).

A.3.4.1 Model Specifications

Table 13 Educational Content Transformer Model Specifications

Parameter	Specification
Model Architecture	MiniLM-L6 (6-layer transformer)
Embedding Dimensions	384
Training Corpus	1B+ sentence pairs
Vocabulary Size	30,522 tokens
Maximum Sequence Length	512 tokens
Model Parameters	22.7M

Note: Inference speeds are hardware-dependent and vary based on system configuration. The analysis was performed on a MacBook Pro M4 Max with 64GB RAM.

A.3.4.2 Educational Domain Adaptation

While the base model was not specifically trained on educational content, its performance on educational tasks is enhanced through:

- **Context Enhancement**: Educational terminology integration
- **Similarity Calibration**: Education-specific threshold adjustment
- **Domain Validation**: Educational expert validation of results
- **Iterative Refinement**: Continuous improvement based on feedback

A.3.5 Educational SDG Knowledge Base

The educational SDG knowledge base is specifically designed to capture the intersection of sustainability concepts with educational objectives and learning outcomes.

A.3.5.1 Educational SDG Definitions

Each SDG is represented through educational lenses:

Table 14 Educational SDG Representation Categories

Category	Description
Learning Objectives	How students can learn about SDG concepts
Competency Development	Skills and abilities related to SDG implementation
Knowledge Areas	Academic disciplines and content domains
Research Applications	How SDGs manifest in academic research
Practical Applications	Real-world applications and case studies
Assessment Methods	How SDG learning can be evaluated

A.3.5.2 Disciplinary Integration

The knowledge base incorporates disciplinary perspectives on SDGs:

- **Economics and Business**: Market mechanisms, economic policy, sustainable business practices
- **Technology and Engineering**: Innovation, infrastructure, digital solutions
- **Social Sciences**: Governance, inequality, social justice, institutional analysis
- **Environmental Sciences**: Climate change, resource management, ecosystem services
- **Policy Studies**: Implementation frameworks, governance structures, international cooperation

A.3.6 Semantic Similarity Computation

A.3.6.1 Cosine Similarity Calculation

The semantic similarity between course content and SDG definitions uses cosine similarity in the 384-dimensional embedding space:

$$Similarity_{semantic} = \frac{\mathbf{e}_{course} \cdot \mathbf{e}_{sdg}}{||\mathbf{e}_{course}||_2 \times ||\mathbf{e}_{sdg}||_2}$$

where $\mathbf{e}_{course}$ and $\mathbf{e}_{sdg}$ represent L2-normalized embeddings.

A.3.6.2 Educational Confidence Thresholds

Table 15 Educational Content Confidence Thresholds

Level	Threshold	Educational Interpretation
High	≥ 0.45	Pedagogical alignment
Medium	≥ 0.35	Moderate educational relevance
Low	≥ 0.25	Weak but meaningful connection
Very Low	≥ 0.15	Minimal educational relevance

A.3.7 Educational Validation Framework

A.3.7.1 Pedagogical Relevance Assessment

Educational validation ensures that identified SDG connections are meaningful from a pedagogical perspective:

1. **Learning Outcome Alignment**: Do identified SDGs align with stated learning objectives?
2. **Curriculum Coherence**: Are SDG connections consistent with course prerequisites and sequences?
3. **Assessment Compatibility**: Can identified SDG concepts be meaningfully assessed?
4. **Resource Availability**: Are educational resources available to support identified connections?

A.3.7.2 Implementation Protocol

1. **Course Text Preparation**: Extract and enhance course descriptions
2. **Educational Context Integration**: Add pedagogical markers and terminology
3. **Embedding Generation**: Create semantic vectors using sentence transformer
4. **SDG Comparison**: Compute similarity with educational SDG knowledge base
5. **Threshold Application**: Apply education-specific confidence thresholds
6. **Pedagogical Validation**: Assess educational relevance and coherence
7. **Result Integration**: Combine results with course metadata and context

A.4 Cross-Methodology Comparative Analysis

A.4.1 Performance Benchmarking

Table 16 Cross-Methodology Performance Metrics

Metric	News	Research	Education
Documents Processed	N/A[1]	483	669
Processing Time/Document	0.8 sec	192 sec	0.15 sec
Memory Peak Usage	0.3GB	1.2GB	0.2GB
SDG Coverage (avg/doc)	2.3	5.1	4.7

A.5 Reproducibility and Implementation Guidelines

A.5.1 Software Infrastructure Requirements

Table 17 Comprehensive Software Dependencies

Component	Version	Purpose	Methodologies
Python	3.9+	Core runtime environment	All
sentence-transformers	2.2+	Semantic embeddings	News, Education
transformers	4.21+	Transformer models	News, Education
torch	1.12+	Deep learning framework	News, Education
scikit-learn	1.3+	ML algorithms	Research, Education

[1] The news analysis system was developed and validated but specific document counts were not reported in the technical documentation

Component	Version	Purpose	Methodologies
spaCy	3.4+	NLP processing	Research
NLTK	3.8+	Text processing	Research
PyPDF2	3.0+	PDF text extraction	All
python-docx	0.8+	DOCX processing	News
pandas	2.0+	Data manipulation	All
numpy	1.24+	Numerical operations	All
matplotlib	3.6+	Visualization	All
seaborn	0.12+	Statistical plotting	All

A.5.2 Hardware Specifications

Table 18 Hardware Configuration

Component	Recommended
CPU	8+ cores, 3.0GHz+
RAM	16GB+
Storage	100GB+ SSD
GPU	NVIDIA GPU with 4GB+ VRAM
Network	High-speed for model downloads

A.5.3 Data Preparation Standards

A.5.3.1 Input Data Requirements

- **Text Encoding**: UTF-8 encoding for all input files
- **File Formats**: PDF, DOCX, TXT support with format-specific handling
- **Content Quality**: Minimum 50 characters for meaningful analysis
- **Language Consistency**: Consistent language usage within documents
- **Metadata Integration**: Available document metadata for enhanced analysis

A.5.3.2 Knowledge Base Preparation

- **SDG Definitions**: Comprehensive, accurate SDG descriptions
- **Keyword Libraries**: Domain-specific vocabulary for each methodology
- **Translation Quality**: Professional translation for multilingual components
- **Regular Updates**: Periodic updates to reflect evolving SDG interpretations

A.5.4 Quality Assurance Framework

A.5.4.1 Validation Protocols

1. **Unit Testing**: Individual component functionality verification
2. **Integration Testing**: Cross-component compatibility assessment
3. **Performance Testing**: Speed and memory usage optimization
4. **Accuracy Testing**: Result quality evaluation against benchmarks

5. **Robustness Testing**: Error handling and edge case management

A.5.4.2 Continuous Monitoring

- **Processing Metrics**: Success rates, processing times, resource usage
- **Quality Metrics**: Confidence distributions, evidence quality scores
- **User Feedback**: Qualitative assessment from domain experts
- **Comparative Analysis**: Performance against alternative approaches

A.5.5 Adaptation Guidelines

A.5.5.1 Language Adaptation

For extending to additional languages:

1. **Character Set Analysis**: Identify Unicode ranges for target languages
2. **Model Selection**: Choose appropriate multilingual transformers
3. **Threshold Calibration**: Empirically determine appropriate thresholds
4. **Knowledge Base Translation**: Professional translation of SDG definitions
5. **Cultural Adaptation**: Adapt concepts for cultural and institutional contexts

A.5.5.2 Domain Adaptation

For application to different domains:

1. **Vocabulary Extension**: Expand keyword libraries with domain terms
2. **Method Weight Adjustment**: Optimize method weights for content characteristics
3. **Threshold Recalibration**: Adjust confidence thresholds for domain specificity
4. **Validation Framework**: Develop domain-specific validation protocols
5. **Expert Integration**: Incorporate domain expert knowledge and feedback

A.6 Conclusion

This methodological annex provides detailed documentation of three distinct yet complementary approaches to SDG analysis across institutional content domains. Each methodology represents a specialized solution optimized for specific content characteristics while maintaining consistency in underlying principles of transparency, reproducibility, and academic rigor.

The multilingual news analysis framework addresses the challenges of institutional communications in diverse linguistic contexts, the multi-method research paper analysis provides coverage of academic content, and the educational semantic framework captures the pedagogical dimensions of sustainability learning.

Together, these methodologies enable institutional SDG impact assessment that can inform policy development, resource allocation, and strategic planning for sustainable development initiatives in higher education contexts. The detailed implementation

guidelines ensure that these approaches can be adapted and reproduced in similar institutional environments worldwide.

The frameworks' modular design, empirical validation, and documentation position them as contributions to the field of computational sustainability assessment, providing both practical tools for institutional analysis and methodological foundations for future research in this domain.

B. Raw data

All data are based on the official AUEB website: https://www.dept.aueb.gr. Table B.1 presents the links to the research papers and course outlines repositories.

Table 19 Raw Data - Links

AUEB School	Department	Link for Working Papers	Seminar
School of Economic Sciences	ECON	https://www.dept.aueb.gr/el/econ/content/%CE%B5%CF%81%CE%B5%CF%85%CE%BD%CE%B7%CF%84%CE%B9%CE%BA%CE%AC-%CE%B4%CE%BF%CE%BA%CE%AF%CE%BC%CE%B9%CE%B1-%CE%B1%CE%BD%CE%AC-%CF%87%CF%81%CF%8C%CE%BD%CE%BF	https://www.dept.aueb.gr/el/econ/content/research-seminar-series
	International and European Economic Studies	https://wpa.deos.aueb.gr/wpa_paper_list.php	
School of Business	Dep of Management Science and Technology	https://www.dept.aueb.gr/el/dmst/content/%CE%B4%CE%B7%CE%BC%CE%BF%CF%83%CE%B9%CE%B5%CF%8D%CF%83%CE%B5%CE%B9%CF%82	https://www.dept.aueb.gr/el/dmst/content/%CE%B5%CF%80%CE%B9%CF%83%CF%84%CE%B7%CE%BC%CE%BF%CE%BD%CE%B9%CE%BA%CE%AC-%CF%83%CF%85%CE%BD%CE%AD%CE%B4%CF%81%CE%B9%CE%B1-%CE%BA%CE%B1%CE%B9-%CF%83%CE%B5%CE%BC%CE%B9%CE%BD%CE%AC%CF%81%CE%B9%CE%B1
	Dep of business Administration	https://www.dept.aueb.gr/el/ode/content/working-papers	https://www.dept.aueb.gr/el/ode/content/working-seminars
	Dpt of Accounting and Finance	https://www.dept.aueb.gr/el/loxri/content/%CE%B5%CF%81%CE%B5%CF%85%CE%BD%CE%B1 https://www.dept.aueb.gr/sites/default/files/DEPARTMENT%20-%20PUBLICATIONS_2_1.pdf	https://www.dept.aueb.gr/el/loxri/content/%CE%B4%CE%B9%CE%BF%CF%81%CE%B3%CE%AC%CE%BD%CF%89%CF%83%CE%B7-%CF%83%CF%85%CE%BD%CE%B5%CE%B4%CF%81%CE%AF%CF%89%CE%BD Conferences
	Dpt of Marketing and Communication	https://www.dept.aueb.gr/el/mbc/content/%CE%B4%CE%B7%CE%BC%CE%BF%CF%83%CE%B9%CE%B5%CF%8D%CF%83%CE%B5%CE%B9%CF%82	https://www.dept.aueb.gr/el/mbc/content/%CE%B5%CF%81%CE%B5%CF%85%CE%BD%CE%B7%CF%84%CE%B9%CE%BA%CE%AC-%CF%83%CE%B5%CE%BC%CE%B9%CE%BD%CE%AC%CF%81%CE%B9%CE%B1
School of Information Science & Technology	Dep of Informatics	https://www.dept.aueb.gr/el/cs/content/%CE%B5%CF%81%CE%B5%CF%85%CE%BD%CE%B7%CF%84%CE%B9%CE%BA%CE%AD%CF%82-%CE%BF%CE%BC%CE%AC%CE%B4%CE%B5%CF%82	https://www.dept.aueb.gr/el/cs/ds

	Dep of Informatics	https://www.infosec.aueb.gr/index.php/2009-01-24-15-10-51/2009-01-24-15-48-27	
	Dep of Informatics	http://nlp.cs.aueb.gr/publications_gr.html	
	Dep of Informatics	http://graphics.cs.aueb.gr/graphics/publications.html	
	Dep of Informatics	http://stecon.cs.aueb.gr/publications/by-date/	
	Dep of Statistics	https://www.dept.aueb.gr/el/statistics_publications	

Our analysis for the research pillar does only covers the papers which were available as a file using the unpaywall[2] API in MATLAB R2025a.

[2] https://api.unpaywall.org/v2/

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