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BUILDING A SUSTAINABLE SOCIETY: WHAT UNIVERSITIES CAN DO?

Abstract: This paper investigates how universities advance the global transition toward a sustainable society by moving beyond rhetorical commitments and embedding sustainability into their core institutional practices. Unlike existing studies that predominantly focus on curricular changes, this research offers a conceptual framework distinguishing two interconnected dimensions of sustainability implementation in higher education: sustainability of the university as an organization, and sustainability through university activities, particularly education and community engagement. This analytical distinction constitutes the original scholarly contribution of the study, enabling a more nuanced understanding of universities' strategic responses to sustainability challenges. The paper examines how global university rankings integrating sustainability indicators have re-shaped institutional priorities and accelerated progress in environmental and social responsibility. Through an analysis of international literature and selected institutional cases, the study demonstrates that universities not only reduce their ecological footprint by improving energy efficiency, minimizing waste, and lowering emissions but also shape societal attitudes by embedding sustainability principles into curricula, research agendas, and behavioural norms. The methodological approach combines qualitative and quantitative analysis of academic sources, institutional reports, and sustainability performance data. The findings highlight an emerging organizational shift: sustainability is increasingly treated as a prerequisite for competitive development in higher education, rather than a peripheral policy goal. The study argues that aligning governance, educational strategies, and operational management with sustainability principles is essential for universities to serve as effective agents of socio-environmental transformation.

Keywords: environmental sustainability, sustainable communities, sustainable practices, sustainable universities, university rankings.

Introduction

When most people hear the phrase "sustainable development", they typically associate it with environmental protection, global warming, climate change, and organizations such as Greenpeace. However, these associations are oversimplified due to the way sustainable development is covered in today's information field. Sustainable development encompasses not only the environment but also economic, socio-political, and cultural issues. The realization of humanity's limited resources and the necessity for a comprehensive global assessment of social foundations emerged gradually, commencing in the 17th century, through the growing awareness of environmental and social issues. This culminated in the conceptualization of sustainable development in the 20th century and its subsequent evolution in the 21st century (Table 1). The table summarizes major historical milestones that shaped the concept of sustainable development, from early resource management ideas to contemporary global policy frameworks, including international agreements and strategic initiatives.

Table 1

Key milestones in shaping the concept of sustainable development

Period / Year	Milestone
17th century	Hans Carl von Carlowitz (German accountant and manager of a mining company) proposed early ideas of sustainability, emphasizing that trees should be grown and preserved to ensure continuous resource use.
18th century	Thomas Robert Malthus (clergyman and economist) argued that population growth exceeds food production, leading to long-term risks such as famine, war, and social upheaval.
Late 19th century	John Muir founded the Sierra Club, developed trails and park facilities, and contributed to the establishment of the U.S. National Park Service.
1968	The Club of Rome was established to study global problems of humanity and disseminate this knowledge worldwide.
1972	The *Limits to Growth* report was published, serving as a tool for assessing long-term future scenarios.
1974	World Conference on Population developed a global plan of action for population and human development.
1980	World Conservation Strategy highlighted the need for environmental conservation as a foundation for sustainable human development.
1984–1987	World Commission on Environment and Development published the report *Our Common Future*, introducing the concept of "sustainable development."
1989	Establishment of CERES (Coalition for Environmentally Responsible Economies), promoting socially responsible investment and sustainable business practices.
1972, 1992, 2012	Major World Conferences on Environment and Development (Stockholm, Rio de Janeiro, Rio+20).
2002	World Summit on Sustainable Development set specific global targets for sustainable development.
2015	UN General Assembly adopted 17 Sustainable Development Goals (SDGs), with 169 targets and 230 indicators.
2019	European Green Deal launched to promote environmental sustainability while supporting economic growth and social well-being.
2021	EU "Fit for 55" package introduced to reduce carbon emissions and implement climate policies, including the Carbon Border Adjustment Mechanism.

The history of sustainable development reflects the gradual evolution of ideas related to environmental protection and socio-economic responsibility, which have increasingly been integrated into political and economic agendas. In recent decades, international initiatives and agreements have contributed to the consolidation of a coherent concept of sustainable development, which now serves as a foundation for global policies and actions across multiple sectors. It is also important to acknowledge the contributions of organizations such as Greenpeace, the World Health Organization, 350.org, the Rainforest Alliance, the World Wide Fund for Nature, and the World Resources Institute, among others, which have played a significant role in advancing and implementing sustainable development principles at the global level.

In the last decade, the topic of sustainable development has also made its way into higher education. Universities have begun to actively integrate the principles of sustainable development into their educational programmes, research activities and daily practices. This process reflects a global shift in the realization of the role of higher education institutions as key actors in the movement towards a sustainable society. With the increasing global focus on sustainable development, many universities have begun to incorporate these aspects into their strategies, also fueled by the growing importance of global rankings assessing their contribution to sustainable development. The desire to improve their positions in such rankings motivates universities to take more active measures to implement environmentally and socially responsible practices, which, in turn, contributes to the wider dissemination of sustainable development principles at the regional and global levels. Universities are assuming an increasingly pivotal role in the pursuit of a sustainable future by leveraging their resources, knowledge, and expertise to address global challenges and enhance the quality of life.

The novelty of this study lies in addressing a critical research gap identified through a comprehensive literature review. While existing scholarship extensively explores sustainable education, our analysis indicates that the body of literature examining the nexus between sustainable development and the second (research) and third (societal) missions of universities remains comparatively limited in scope.

This gap is further supported by a targeted search in the Scopus database, which revealed only a small number of publications related to the query «university sustainability rankings». This finding suggests that studies investigating the relationship between sustainability rankings and the broader activities of universities are still underdeveloped and warrant greater academic attention.

Against this backdrop, the present study aims to identify and systematize approaches to integrating sustainable development principles into university activities. To achieve this, the paper is structured around three research questions:

First, the study examines current trends, key themes, and dominant narratives in contemporary sustainability-related publications, addressing the question: How is sustainable development conceptualized in current academic discourse?

Second, it analyzes the role of global rankings in assessing sustainable university performance, addressing the question: What factors have driven universities to adopt and implement sustainable development principles?

Third, the study identifies two principal directions through which universities can advance sustainability and evaluates practical approaches to their implementation, addressing the question: How can universities shape sustainable development within their activities?

Methods and organization of research

The methodology employed permitted the formulation of the general approach and methods utilized to accomplish the objectives and fulfill the tasks outlined. The research was guided by a set of principles, procedures, and tools that included the application of methods for data collection, analysis, and interpretation. Additionally, the use of both qualitative and quantitative approaches to information processing was employed. The division of the work into two distinct phases the theoretical analysis of the problem and the demonstration of practical experience facilitated a more structured and effective management of the project. Scientific works, policy and reporting documents of international organizations and official websites of these organizations served as the factual basis for this study. Secondary data were collected by analyzing scientific publications through searchable identification in the Scopus database using keywords and terms related to sustainable development. The authors performed a comprehensive literature analysis covering Russian and English language publications from 2000 to 2024. The following research methods were applied to analyze publications using the keywords «sustainable development in higher education».

In the preliminary search and filtering phase, a comprehensive search of all database fields was conducted to identify as many relevant publications as possible, resulting in the retrieval of 4,022 publications. The search was based on the use of keywords, which facilitated the focus on the research topic. Limiting the languages option to English and Russian ensured a focus on a specific audience and context. Exclusion of related fields of knowledge allowed to narrow the focus on the educational sphere and exclude irrelevant documents, resulting in the selection of 1,674 documents.

In the second stage, a stricter filter was applied, restricting the search to publication titles, abstracts and keywords, which significantly reduced the number of documents to 163. This approach enables a more exact correlation of publications with the research topic and provides access to the primary abstracts, which is beneficial for further analysis. After creating a database of 163 documents, a quantitative analysis was carried out, including a description of publications according to various criteria such as years of publication, countries,

organizations and other established categories. This made it possible to identify trends in publication activity and to identify the most active regions and organizations in the study area. Using a comparative approach allows the number of publications to be compared according to different criteria, such as types of knowledge areas or funding organizations. This helps to identify the areas or organizations that contribute most to the development of sustainable development theory and practice.

The research team evaluated the findings, identifying key trends and patterns. The paper also presents the results of its own research, obtained through quantitative calculations, statistical processing of data, illustrating the ways in which the university is moving towards a green policy. To present the experience of implementing sustainable development initiatives at the university, methods were used to present metrics on energy and water saving, waste recycling volumes by comparing data before and after the implementation of the initiatives. Tables and figures allowed visualizing the data.

The research methods used contribute to an in-depth understanding of the topic, allowing a holistic view of the research to be constructed. They also help to identify key actors, identify current trends, and identify possible directions for future research and practice.

Literature Review

In order to answer the first research question, a quantitative-qualitative analysis of the current scientific discourse was carried out at the initial stage of the study. Searching and filtering publications in the Scopus database allowed us to identify the most relevant studies to the topic of the work.

The following observations emerged from the analysis. First, publication activity on sustainable development in higher education appears to be closely linked to key milestones in the evolution of the sustainable development concept, as well as to broader global economic, political, and social trends:

2002 – The World Summit on Sustainable Development in Johannesburg brought heightened global attention to sustainability issues, which likely contributed to an increase in academic publications, including research conducted within universities.

2015 – The adoption of the Sustainable Development Goals (SDGs) by the United Nations established a set of global benchmarks for governments, organizations, and higher education institutions, leading to a notable surge in scholarly output aimed at supporting and analyzing these goals.

2020-2021 – The COVID-19 pandemic underscored the importance of sustainable development, particularly in relation to public health, economic resilience, and environmental sustainability, further stimulating academic interest in the field.

These trends suggest that scholarly attention tends to intensify in response to major global events and crises. At the same time, a tension persists between studies focused on historical and conceptual dimensions of sustainable development and those addressing its practical implementation within higher education institutions.

2) There are leading positions of the UK, Germany, Sweden and the USA in publications on sustainable development, which is due to the political, economic, academic and cultural characteristics of these countries. To illustrate, the United Kingdom is one of the foremost global hubs for research and academic pursuits. Notable academic institutions such as the University of Oxford, the University of Cambridge, and the London School of Economics are actively engaged in research pertaining to sustainable development. Additionally, the country's policies are aligned with this objective, with a particular emphasis on the green economy and addressing climate change. Sweden has robust environmental legislation and a substantial investment in climate, sustainable development, and environmental research. The United States boasts a well-developed system of higher education

and is a global leader in scientific research. The United States has a plethora of publicly and privately funded programs and grants that serve to stimulate research and publications in the field of sustainable development.

A comparative reading reveals gaps: although research is concentrated in these countries, few studies examine whether these approaches are transferable to lower-resource contexts, which limits the generalizability of current findings.

3) A review of the distribution of publications by topic in the field of sustainable development reveals that the social sciences (29.8%) are the primary focus, with research investigating the impact of sustainable development on society, the economy, and politics. This analysis delves into the social and cultural dimensions of the transition to sustainability. Environmental sciences (19.9 per cent) focus on the study of ecological processes, climate change and biodiversity conservation, making them key in the context of sustainable development. Energy (14.6%) focuses on renewable energy and energy efficiency, which are important components of sustainable development. Engineering (10.7%) plays an important role in developing technologies and infrastructure that promote sustainable development, such as sustainable building materials and water supply and treatment systems.

While coverage is diverse, there is a notable gap in research linking sustainability to universities' research and social missions, and few studies analyze the impact of global sustainability rankings on university strategies.

At the next stage of the research, a content study of the outlined publication field was carried out. This work allowed us to see that most of the works consider the ideas of sustainable development from two perspectives:

- historical overview of the concept of sustainable development,
- ways of disseminating ideas in higher education and university activities.

Numerous works provide an overview and chronological description of the concept of sustainable development. Here are some examples of scientific works published in the last 2-3 years on this topic.

The research conducted by Justice Mensah from the University of Cape Coast in Ghana is highly valuable (Mensah, 2019). The paper presents a comprehensive literature review on sustainable development, providing a clear definition of the concept and explaining its key aspects. The author refers to 126 articles covering various aspects of sustainable development, of which 61 articles are subject to full analysis. Another work to keep the issue debatable for wider public awareness is the book «Materials and Sustainable Development» (Ashby, 2022) by Michael F. Ashby, a scientist and professor at the Royal Society and Cambridge University. The initial section of the book outlines the efforts and practical measures taken by the global community to address sustainable development concerns. This is achieved through an analysis of reports published by international experts and organisations. Agoga-Jonsson explores the approach to sustainable development by highlighting critical statements and responses in their work «The Sustainable Development Goals: A Universalist Promise for the Future» (Agoga-Jonsson, 2023). The paper by Yawer, Bakr, and Fathi (Yawer et al., 2023) from Alexandria University in Egypt explores the concept and principles of sustainable development to achieve the goal of preserving and enhancing urban history for the benefit of the environment, society, culture, and economy.

It should be noted that HEIs are often described as active participants in the sustainable development of society.

Universities are incorporating sustainable development goals into their activities, which are becoming an integral part of their identity and defining their organizational, academic, scientific, and social processes. Additionally, universities are actively informing the public about the transformations resulting from sustainable development (Cuesta-Claros et al., 2023; Zhao & Cheah, 2023).

Other papers present a diagnostic analysis of how higher education teachers integrate sustainable development into their curricula. It aims to reveal the peculiarities of their perception and behavior in this field (Leal et al., 2023; Howell, 2021).

In the academic discourse, we also find works on the evaluation criteria of «sustainable» universities (Dawodu et al., 2023), on the dependence of a student's conscious involvement in sustainable development on the profile orientation of his educational trajectory (Cachero et al., 2023), on the experience of applying an interdisciplinary pedagogical method to create a learning environment that stimulates problem-solving skills related to sustainable development (Alm et al., 2021), and on many other general and specific issues. Comparing these studies shows that while some focus on measurement and evaluation of sustainability, others emphasize pedagogy and curriculum integration, indicating a fragmented field with little consensus on holistic approaches.

The literature review revealed that the modern academic world focuses on studying systemic approaches and paradigms related to the modification of organizational and academic strategies of universities, as well as providing specific examples of sustainable development implementation in various university activities. These two directions can be labelled as papers on the creation of sustainable education and on how the university adheres to the principles of sustainable development. However, the literature reveals notable gaps and tensions: while a substantial body of research addresses sustainable education, comparatively fewer studies examine how universities implement sustainability within their research and social missions. Similarly, empirical analyses of the impact of sustainability-oriented university rankings remain scarce. These gaps highlight the need for further research to investigate how universities integrate sustainability principles across all dimensions of their mission, providing a more comprehensive understanding of their contribution to sustainable development.

Study Results and Analysis

The analysis of literature allowed us to answer the first research question, «How does sustainable development sound in contemporary publications?», showing that sustainable development in higher education is articulated as both a conceptual evolution and a practical institutional agenda. Publication dynamics reflect global milestones – such as the adoption of the SDGs and the post-pandemic context – indicating that scholarly attention intensifies in response to major social, economic, and environmental challenges. The discourse is dominated by contributions from countries with strong environmental policies and advanced academic systems, and by research within the social sciences, followed by environmental and technological fields. Across publications, two main lines of argument prevail: exploring how the idea of sustainability has been defined, expanded, and legitimised over time, and analysing how universities integrate sustainability principles into governance, campus operations, curricula, and public engagement. At the same time, the discourse remains uneven: significantly fewer studies address sustainability in the research and societal missions of universities or examine the influence of sustainability-oriented rankings. Overall, contemporary publications present sustainable development as a strategic driver of institutional transformation and competitiveness in higher education.

In order to answer the second research question «What prompted modern universities to move towards implementing sustainable development principles?», the paper analyzes the system of evaluation of universities by world rankings on sustainable development.

In the contemporary academic context, the question of university reputation has assumed a pivotal importance. A reputation for excellence is evidenced by a high ranking in global rankings of educational organizations. Participation in the rankings allows universities to gain recognition on the international stage, thereby enabling them to address significant challenges. These include attracting talented students, securing the interest of sponsors and partners willing to align their investments with successful universities, strengthening the

academic staff with leading scientists and teachers, stimulating improvements in the quality of education, research, and other aspects of their activities, and enhancing the international recognition of the university and its position within the global educational community. In this regard, many universities are actively working to improve their positions in the rankings, investing efforts in improving various aspects of their activities. It turns out that one of the tools that laid the foundation for the introduction of sustainable development principles in the activities of higher education organizations are international university rankings (Burmann et al., 2021).

World ranking agencies and companies have developed detailed criteria for assessing the performance of universities in terms of their involvement in the sustainable development of society. The most authoritative among such rankings are the following:

- UI GreenMetric, initiated by the University of Indonesia;
- Times Higher Education Impact Ranking, in co-operation with Times Higher Education (THE) magazine;
- QS Sustainability Ranking, developed by the British agency Quacquarelli Symonds (Table 1).

Table 1

Categories and indicators used in university assessment by international rankings on sustainable development

Ranking and assessment criteria	*Assessment categories*	*Indicators*
UI GreenMetric World University Ranking Number of universities assessed – 1050	**6 categories**: - overview of the university's size and zoning profile: urban, suburban - energy and climate change - waste - water - transport - education and research.	**39 indicators**: Green spaces, open spaces, inclusive infrastructure, health care; electricity consumption, smart building, renewable energy, carbon footprint; recycling and reusing waste, reducing the amount of paper and plastic used; water conservation program, water recycling program, water saving program; zero-emission vehicle policy, reduction program, vehicles, pedestrian area enhancement program; student communities of engagement in sustainability, funding for sustainability research, activities, events, publications on sustainability, etc.
Times Higher Education Impact Ranking Number of universities evaluated – 1705	**17 categories by number of sustainable development goals**: - end poverty - end hunger - well-being - quality education - gender equality; - clean water and sanitation - affordable and sustainable energy - decent work - technology to benefit all - reduce inequality - safe cities and communities - responsible consumption by all - stop climate change - protect the ocean - take care of the earth - live in peace - mechanisms and partnerships to reach the goals	**10 and more indicators for each SDG:** university anti-poverty programs; campus food waste; agriculture and aquaculture graduates; Health and well-being research; health services; lifelong learning; women scientists and faculty members; research on clean water and sanitation; water use and care; affordable and clean energy; trade unions and labor rights; equal pay rights; research on industry, innovation and infrastructure; non-discriminatory policies; diversity and equality; public access to university libraries, museums, exhibitions, open and green spaces; policies for proper disposal of hazardous waste, recycling, minimizing the use of plastic and disposable items; education programs or campaigns on climate change, climate change action plan, cooperate with NGOs on climate change adaptation issues; activities aimed at promoting the conservation and sustainable use of water bodies; conservation, restoration and sustainable use of land ecosystems associated with the university; academic freedom, anti-corruption, open financial reporting; partnership with regional NGOs and government to realize SDGs, etc.
QS Sustainability Ranking Number of universities assessed – 1400	**2 categories**: - environmental sustainability - social influence.	**More than 40 indicators for each area**: sustainable institutions; sustainable education; sustainable research; equality; Knowledge sharing; impact on education; employment opportunities; quality of life.

This table demonstrates the approaches of international rankings to assessing the performance of universities in terms of their role in sustainable development. We see a detailed elaboration of criteria and indicators: a university must demonstrate its commitment to the principles of sustainable development in its academic activities, scientific research, social projects and environmental activities. The indicators reflecting the way the university organizes all cycles of life activity from the point of view of respect for the environment are of great weight. The methodologies of these rankings can be considered as a kind of guide to creating «sustainable» universities; they help universities become more environmentally friendly.

In response to the second research question «What prompted modern universities to move towards implementing sustainable development principles?», it can be concluded that international university rankings on sustainability played a decisive role. By establishing detailed criteria and indicators for assessing environmental, social, and academic performance, these rankings created incentives for universities to integrate sustainable development into governance, research, education, and campus operations. Participation in such rankings not only enhances institutional reputation and global recognition but also motivates universities to adopt concrete measures promoting environmental responsibility, social impact, and sustainable practices across all aspects of university life.

A review of the literature and an analysis of the methodologies used in leading international rankings enabled the identification of two distinct approaches to conceptualizing a sustainable university: sustainable development of the university and sustainable development within the university (addressing the third research question: «How can a university shape sustainable development in its activities?»). Although these formulations may initially appear tautological, they reflect two analytically distinct dimensions.

The sustainable development of the university is understood in terms of its infrastructure and operational environment. Firstly, this is the construction of all cycles and processes of the university's life on the principles of sustainable development, the creation of a «sustainable» university: energy saving activities, alternative sources and types of energy, environmentally friendly hygiene products, waste sorting and recycling, recycling and reuse of waste, ecology of water and transport, digital image of the university, smart university, etc.

Secondly, it is cultivating a healthy lifestyle, creating an environment in which students and staff are physically and mentally healthy, harmoniously developed and support the ideas of sustainable development: sports policy and corporate culture, psychological well-being and creating opportunities for personal growth and development, environmental and social initiatives and activities (greening, waste sorting and recycling, minimizing the use of paper and plastic).

Thirdly, this is the formation of a healthy socio-cultural environment: national, cultural, religious tolerance, respect for traditions, gender equality.

Fourthly, this is cooperation with partners on issues of sustainable development: volunteer activities together with private commercial and public organizations, participation in national projects.

We describe sustainable development at the university through education and science. Integration of sustainability principles into educational activities is carried out through transformation of academic strategy; development and implementation of disciplines incorporating sustainability ideas; organization of student internships at enterprises promoting sustainable development; performance of diploma, master's, and doctoral theses on sustainability topics. It is also important to create new educational programmes that train specialists able to address these challenges (Saginova et al., 2012). In research, including sustainability issues in university projects helps popularize the topic and advance innovation to a sustainable-technological level.

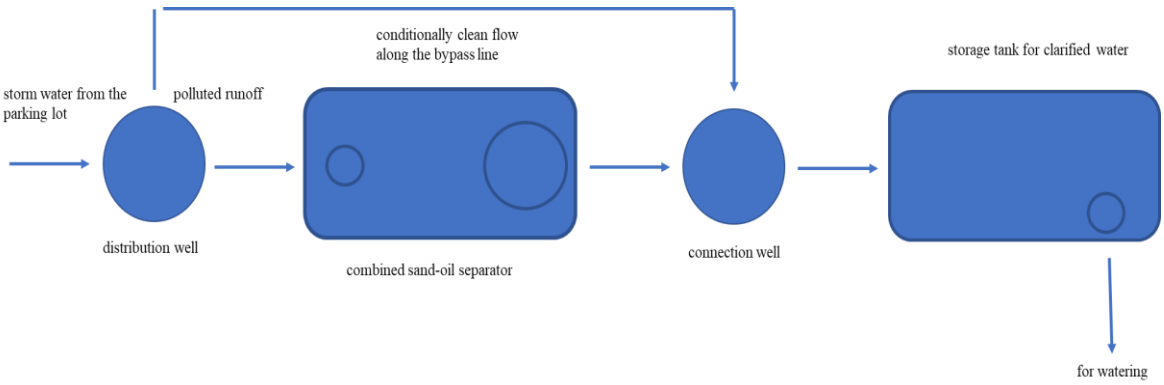
In this section, we will examine the university's sustainable development practices by analyzing specific measures and initiatives implemented as part of this process. Particular emphasis will be placed on the efficacy of the implemented technologies and their influence on enhancing the environmental and educational performance of the university.

The introduction of energy efficient technologies into the university infrastructure has an impact on improving the public image of the institution, strengthening its reputation as a leader in sustainable development and attracting stakeholders, including students, partners and funding organizations. Energy-efficient technologies strengthens the university's public image and reputation as a sustainability leader. Replacing traditional lighting with Class A energy-efficient fixtures and implementing automated heating controls and solar systems have led to substantial reductions in energy use. For comparison, MIT reduced lighting energy by 50%, saving $500,000 annually (Massachusetts Institute of Technology, n.d.).

Efficient water management is another key aspect. At D. Serikbayev East Kazakhstan technical university, the collection of rainwater and runoff from parking lots, installation of water-saving devices, and drip irrigation of plantings enabled a 54% reduction in water usage between 2022 and 2024. (Figure 2).

Figure 2

Surface wastewater treatment system for irrigation



In order to prioritize waste management and optimize waste treatment processes, it is necessary to assess current waste volumes and types, identify weaknesses in existing management and treatment systems, and analyze the effectiveness of already implemented technologies and practices. This will enable the development of targeted improvement measures, introduction of new technologies and process improvements based on the evidence and identified needs (Table 2).

Table 2

EKTU waste and recycling (2024)

Type of waste	Waste materials, tonnes	Reuse, tonnes	Recycling, tones	Total, tonnes	How it's recycled
Organic waste					
sawdust (carpenter's workshop)	0,48	0,48			are used in preparing plantings for winter, composting and construction
food waste (canteens, cafes)	17.22	17.22			pet food
grass clippings (campus)	10.23		6		composted to produce compost, which is then used for planting plants
fallen leaves (campus)	68,20		2		
Organic waste, total	96,13	17,7		25,7	
Inorganic waste					
hard plastic	2,8		2,8		processed by third-party companies: Eco Vostok Leader LLP, Clean Sky, Polygrand, Visit, ABS
soft plastic	1,5		1,5		
waste from furniture manufacturing	10	5			materials are used for the second time
metal structures	0,75	0,38			pipelines, metal frames for furniture, ventilation ducts, etc. are reused.
Inorganic waste, total	15.05	5,38	4,3	9,68	
Toxic waste					
electronic waste	1,5		1,5		recycled/properly disposed
mercury lamps	0,37		0,37		properly disposed
laboratory chemicals	0,03		0,03		stored safely and then transferred for disposal under an agreement
Toxic waste, total	1,9		1,9		

Note: The empirical institutional data include energy, water, and waste indicators derived from the university's internal reports for 2022–2024, collected by the Competence Center for Ecology and Life Safety through administrative statistics and internal monitoring procedures.

Waste management at EKTU (2024) demonstrates responsible and effective handling of materials. Organic waste (96.13 tonnes) is largely repurposed or recycled, with food waste and sawdust almost entirely reused, and significant portions of grass clippings and fallen leaves composted. Inorganic waste (15.05 tonnes) shows selective recycling and reuse, particularly plastics, metal structures, and furniture materials. Toxic waste (1.9 tonnes) is fully and safely disposed of, ensuring minimal environmental impact.

Based on this recycling data, it is clear that EKTU can further enhance its sustainability performance. The predominance of organic waste and its extensive reuse indicate that developing more advanced composting systems and expanding programs for repurposing organic materials should be a priority. For inorganic waste such as plastics, metals, and furniture, improving sorting and recycling processes and introducing additional methods could increase efficiency. Maintaining strict protocols for toxic waste disposal will continue to minimize environmental risks. Finally, fostering active participation of students and staff through training and sustainability projects will strengthen the university's environmental culture and support a broader implementation of practical waste reduction and recycling measures.

Regarding the sustainability of the university, we have only presented some of the results of sustainable activities. However, EKTU is also actively engaged in other areas such as transport, pedestrianization, smart building technologies, sustainable budgeting, and inclusion, demonstrating a multi-dimensional approach to campus sustainability.

The overarching objective of sustainable development at the university is the creation of a sustainable ecosystem. This encompasses the efficient management of energy, water, transport, and waste, with the aim of minimizing environmental impact and promoting long-

term sustainability. Such initiatives foster an environmentally aware community, enhance the level of responsibility among students and staff, encourage participation in sustainable practices, and serve as an exemplar for other organizations by promoting a culture of sustainability outside of the university.

As for the second direction, sustainable development within university activities, it primarily involves two key dimensions.

First, it includes the transformation of academic provision through the introduction of new educational programmes explicitly addressing sustainability challenges. Examples include programmes such as International Master in Sustainability and Circular Bioeconomy (Rome Business School), Design of the Built Environment (University of Dubai), and Bachelor of Science in Sustainable and Renewable Energy (University of Sharjah) (Abo-Khalil, 2024), as well as programmes focused on environmental and sustainable development offered by universities in Kazakhstan.

Second, it involves the integration of sustainability-oriented disciplines into existing curricula. These include courses such as ESG and Sustainable Development, Ecotoxicology and Environmental Sustainability, Economics for the Environment and Sustainability, Social Sustainability and Welfare Management, and Sustainable Industrial Pharmaceutical Biotechnology (Viviani, 2022).The introduction of these programs and courses is not only an expansion of educational offerings but also a deliberate strategy to increase interdisciplinarity, strengthen innovation in research, and attract students and faculty motivated by sustainability. By embedding sustainability principles into academic content, the university ensures that graduates are equipped with both theoretical knowledge and practical skills relevant to sustainable development. This approach also allows the university to contribute actively to global sustainability goals while enhancing its academic prestige and competitive positioning.

In response to the third research question, «How can the university shape sustainable development in its activities?», it can be concluded that universities promote sustainability through two interconnected dimensions. First, by developing their infrastructure and environment implementing energy- and water-efficient technologies, waste reduction and recycling systems, smart campus solutions, and creating a healthy, inclusive socio-cultural environment. Second, by transforming academic and research activities – introducing sustainability-oriented curricula, new educational programs, and research projects that integrate environmental and social responsibility. These combined efforts foster a sustainable university ecosystem, enhance environmental and educational performance, cultivate an engaged and environmentally aware community, and position the university as a model of social and ecological responsibility.

Discussion

The study shows that sustainable development is increasingly recognized as a core institutional responsibility, integrated across governance, social engagement, and educational and research activities. This aligns with contemporary publications, which present sustainability as a strategic orientation rather than a peripheral initiative. Importantly, universities embed sustainability into their institutional identity, reflecting a broader organizational commitment that goes beyond isolated initiatives.

The influence of sustainability rankings reflects the growing interconnection between global standards and institutional behavior. Universities are not only responding to reputational incentives but are also negotiating the expectations of multiple stakeholders, including governments, industry partners, and society at large. It raises questions about the balance between external expectations and genuine institutional commitment, suggesting that strategic decisions may prioritize visibility alongside substantive environmental and social outcomes.

The findings suggest that while universities implement sustainability through operations and education, their role in research and societal engagement is less developed.

From a discursive perspective, this indicates that current university practices may address internal sustainability effectively but have limited influence on broader social and environmental challenges. Compared to existing literature, which often emphasizes curriculum integration, this study highlights a gap in linking operational and educational efforts with external collaboration. Addressing this gap could strengthen the university's capacity to act as an agent of societal sustainability, suggesting that future strategies should prioritize structured partnerships with communities, industry, and international networks. This discussion underscores the need for a more holistic approach, integrating internal practices with outward-facing initiatives to maximize the university's impact.

Sustainable development within the university is an ongoing and participatory process that requires continuous improvement and engagement of all stakeholders. By embedding sustainability into every functional area – governance, operations, education, research, and outreach universities become not only centres of knowledge generation but also active contributors to solving global sustainability challenges.

This study has several limitations that should be acknowledged. First, it focuses on a limited number of universities and specific institutional cases, which may constrain the generalizability of the findings. Second, part of the analysis relies on secondary data from institutional reports, which may contain reporting biases or incomplete information. Finally, the literature review is restricted to publications available in English and Russian, potentially excluding relevant contributions in other languages.

Conclusion

Higher education institutions have a significant responsibility for sustainability and achieving the Sustainable Development Goals, playing a fundamental role in the transformation of regional and national economies, politics, and cultures. Contemporary publications confirm that sustainable development is increasingly embedded in university governance, social engagement, education, and research, highlighting that universities integrate sustainability into their institutional identity, moving beyond isolated initiatives. This addresses the first research question by showing that sustainability is recognized as a core strategic orientation rather than a peripheral concern.

The study also demonstrates that global sustainability rankings and the expectations of multiple stakeholders including governments, industry, and society have prompted modern universities to implement sustainability principles systematically. Ranking indicators have influenced universities to develop comprehensive sustainability strategies, improve infrastructure, enhance energy efficiency, and adopt technologies such as smart buildings, renewable energy, and waste management systems. These measures not only reduce ecological footprints and improve campus environments but also reflect universities' responses to reputational and societal incentives, answering the second research question regarding the drivers of institutional action. Universities are revising their strategies to meet social needs and political-economic expectations, with a focus on sustainable development (Ferrer-Balas D. et al., 2009).

In terms of shaping sustainable development in their activities, universities implement a combination of operational, educational, and research initiatives. They transform academic programs by introducing sustainability-oriented curricula, establish research projects with environmental and social relevance, and integrate sustainability into daily operations. However, the analysis reveals that the integration of research and societal engagement remains comparatively limited. Bridging this gap through structured partnerships with communities, industry, and international networks could enhance universities' influence on broader societal sustainability. This addresses the third research question by emphasizing the need for a holistic approach that combines internal practices with outward-facing initiatives.

These findings carry important implications for policymakers and university leaders. Policies and institutional strategies should support the alignment of sustainability rankings with meaningful local and global impact, encourage resource allocation for operational and research initiatives, and foster interdisciplinary programs that equip graduates with both theoretical knowledge and practical skills. Leadership at universities should prioritize transparency, stakeholder engagement, and long-term planning to ensure that sustainability efforts go beyond compliance and generate measurable social, environmental, and educational outcomes.

Finally, the study suggests directions for further research. Future investigations could examine the effectiveness of integrated sustainability initiatives across diverse universities, explore the impact of partnerships between higher education institutions and external stakeholders, and develop frameworks for measuring the contribution of universities to societal sustainability beyond rankings. Such research would provide a more comprehensive understanding of how higher education can serve as a catalyst for sustainable development at multiple levels.

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Conflict of Interest Statement

The authors declare no potential conflicts of interest regarding the research, authorship, or publication of this article.

Author Contributions

The authors affirmed that there is no conflict of interest in this article. Saule Zh. Rakhmetullina carried out the conception and investigation. Zhadyra T. Konurbayeva overlook the writeup of the whole article and prepared the relevant literature. Darya S. Surova wrote the research design and conducted the data entry, revised critically the article for intellectual content. Olga A. Petrova carried out the data analysis. Mikhail V. Sizov prepared the interpretation of the results, contributed to drafting and revising the article.

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