



# “Do higher education institutions contribute to countries’ SDG progress: Evidence from university rankings”

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# DO HIGHER EDUCATION INSTITUTIONS CONTRIBUTE TO COUNTRIES' SDG PROGRESS: EVIDENCE FROM UNIVERSITY RANKINGS

## Abstract

The UN Sustainable Development Goals (SDGs) have become a universal call to action over the past few years and a basis for assessing the progress of sustainable development of countries and organizations. This paper aims to identify the relationship between the sustainable development activities of universities in different regions of the world, as reflected in the Times Higher Education Impact Rankings (THE IR), and the progress towards achieving SDGs of the countries in which these universities operate. The research methods were correlation analysis and robust regression tools, and parametric and non-parametric methods of variance analysis. The information base was the results of annual reports based on the THE IR and Sustainable Development Reports for 2017–2021. The results confirm the existence of directly proportional close correlations between the variables, while the regression analysis confirmed that a one-unit increase in the overall THE IR ranking score leads to a corresponding increase in the overall progress of countries in achieving SDGs (on average by 0.2–0.3 units) and SDGs 3, 8, 11, 16 in particular. It was also found that universities play a key role in achieving different SDGs in various regions. In Latin America, the Caribbean, the Middle East, and North Africa, universities are critical for SDG 17 achieving. In OECD countries, universities contribute most to SDG 3. Examples of the best practices that can be used as a guide for university administrations that are at the beginning of developing sustainable development policies are also given.

## Keywords

sustainable development, SDGs, university rankings, Times Higher Education, Impact Rankings, sustainable development report

## JEL Classification

Q01, Q56, O11

## INTRODUCTION

Despite frequent criticism of international university rankings (Fauzi et al., 2020; Pavel, 2015), they remain an influential marketing tool, are an analytical basis for making management decisions (Altbach, 2012), and are in constant development. New rankings are emerging; for example, the British rating agency Times Higher Education is launching two new ratings in 2024 – THE Online Learning Rankings (Times Higher Education, 2023a) and THE Interdisciplinary Science Rankings (Times Higher Education, 2024).

It is worth noting a new, but dynamically developing direction of ranking universities according to their contribution to sustainable development. One of the first such rankings was the Indonesian UI GreenMetric project, which has been implemented since 2010 (UI GreenMetric, 2010). A powerful impetus to the development of uni-

versity rankings for evaluating the activities of higher education institutions in the area of sustainable development was the approval of the UN 17 Sustainable Development Goals (SDGs) in 2015 (United Nations, 2015). In 2019, Times Higher Education published the first edition of THE Impact Rankings (THE IR), the methodology of which is based on 17 SDGs (Times Higher Education, 2019). 467 universities from 76 countries of the world took part in the first version of the mentioned ranking. In 2022, another British rating agency, Quacquarelli Symonds (QS), created the QS World University Rankings: Sustainability (QS Sustainability Rankings), which covers 700 higher educational institutions from around the world (QS, 2022).

The impact of university rankings on sustainable development could not remain unnoticed by scientists. There is also a growing scientific interest in studying the activities of HEIs in accordance with the Central Development Strategy (Prieto-Jiménez et al., 2021), which is directly reflected in the results of these rankings. It is difficult to overestimate the role of universities in achieving SDGs, given their educational and research missions. Moreover, universities are powerful stakeholders in sustainable development issues both at the community level (Orzhel et al., 2024) and globally (Blasco et al., 2020). Obviously, the level of economic development of countries and regions, as well as their progress in achieving SDGs, determines the possibilities and conditions for the functioning of higher educational institutions. At the same time, universities are not the only driving force of countries on the way to sustainable development. Moreover, the results of their “sustainable” activity can be manifested after years and decades.

Currently, the problem of quantifying the contribution of higher educational institutions to ensuring the sustainable development of countries and the world remains unresolved. The appearance of university rankings on sustainable development made it possible to conduct such an assessment of higher educational institutions’ activities and rank them by each SDG. The results of THE IR can be used to model the contribution of universities to the overall progress towards achieving the SDGs of countries in which they operate.

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## 1. LITERATURE REVIEW AND HYPOTHESES

The study of higher educational institutions’ activities on sustainable development and the corresponding university rankings is gaining momentum in the academic environment, which can be explained by the increase in the number of universities that annually participate in them. In particular, the 2023 edition of THE IR includes 1,705 HEIs, while 1,406 universities were rated a year earlier (Times Higher Education, 2023b).

The analysis of research results presented in the Scopus database showed that the most relevant to the issue of university contribution to the achievement of SDGs and the corresponding evaluation by university rankings are publications belonging to the fields “Social Sciences” and “Environmental Sciences.” Table 1 shows the number of publications and citations for the years 2018–2023 using the SciVal toolkit (SciVal, 2024) in the fields of “Social Sciences” and “Environmental Sciences”

for the search queries “Green university rankings,” “SDGs university rankings” and “Sustainability university rankings.”

The data in Table 1 show that publication activity on the topic of university rankings on sustainable development is growing. This is especially evident for the search query “SDGs university rankings,” the number of publications on which has increased exponentially in recent years.

A detailed analysis of the most cited publications, which were considered in Table 1, showed that the object of research is mainly the best practices of higher educational institutions for achieving SDGs, relevant university policies, and a comprehensive assessment of higher educational institutions’ activities in the field of sustainable development.

Kioupi and Voulvoulis (2020) study the contribution of universities to sustainable development through the implementation of educational programs. The authors developed a scientific and

**Table 1.** Number of publications and citations in 2018–2023 on the subject of university rankings on sustainable development in the fields of “Social Sciences” and “Environmental Sciences” according to SciVal

Bibliometric index	2018	2019	2020	2021	2022	2023
<b>Green university rankings</b>						
Number of publications	23	15	20	15	21	41
Number of citations	236	236	236	170	141	75
<b>SDGs university rankings</b>						
Number of publications	1	4	6	10	11	24
Number of citations	4	73	129	131	77	24
<b>Sustainability university rankings</b>						
Number of publications	50	56	83	74	94	107
Number of citations	706	1198	1091	635	442	141

methodological toolkit for evaluating educational programs through the prism of the Centers for Disease Control and Prevention, which made it possible to identify a number of gaps related to solving problems in the field of health care, well-being, and diversity. Another publication emphasizes the importance of aligning university policies with SDGs, establishing appropriate centers, and developing educational programs to support SDGs (Ambariyanto & Utama, 2020). Moreover, researchers conclude that this process needs to involve all stakeholders and identify priority SDGs (Pakkan et al., 2023).

The importance of reporting on sustainable development by universities is emphasized while focusing on activities to achieve specific SDGs (De La Poza et al., 2021). The analysis of sustainable development reports on university websites in individual countries shows that higher educational institutions continue to prioritize activities to increase economic indicators and campus development, while environmental and social aspects of sustainable development are not considered (Amoako, 2023). At the same time, the very fact of significant progress in creating a green and ecologically clean campus not only demonstrates the university's commitment to sustainable development (Anis et al., 2018) but also becomes one of the tools for creating a competitive advantage for the university (Atici et al., 2021).

Universities' progress in achieving SDGs has also been linked to the internationalization of educational activities to shift universities from the current exploitative business model in international higher education to a strategy that prioritizes so-

cial justice and environmental sustainability, emphasizing the respective benefits for learners and society as a whole (Healey, 2023). It has been proven that one of the mechanisms of such a transformation of higher education is the creation of university alliances, which will not only strengthen the strategic partnership of higher educational institutions but also have a positive impact on sustainable development (Arnaldo Valdés & Gómez Comendador, 2022).

It has also been proven that there is a significant relationship between environmental practices of personnel management in universities, employees' commitment to environmental protection, and university environmental indicators. The importance of promoting the exchange of environmental knowledge among employees and strengthening the environmental commitment of employees is emphasized (Ahmad et al., 2023).

At the same time, currently, there is a lack of research on the interdependence of activities of higher educational institutions in achieving SDGs and the progress in the sustainable development of countries in which they operate. Recently, there have been many publications that analyze the relationship between indicators of sustainable development, including in accordance with the relevant SDGs, and the development of small and medium-sized companies in the respective country (Kovalov, 2024), the transparency of companies in the financial and real sectors of the economy (Cavagnetto et al., 2022; Kumar Soni, 2023) and the general economic growth of individual states (Ziky & El-Abdellaoui, 2023), etc. At the same time, the relationship between national indica-

tors of sustainable development and the activities of educational institutions, which can be assessed not only by financial and non-financial reports but also by international rankings, is currently poorly researched.

As for the list of rankings themselves, through the prism of which the activities of universities are analyzed, QS World University Rankings: Sustainability is hardly mentioned in the publications of scientists, which can be explained by the fact that its first edition appeared only at the end of 2022 (QS, 2022). Most studies in the field of university rankings on sustainable development refer to UI GreenMetric and THE IR, whose methodologies, according to scientists, are not ideal.

Veidemane (2022) criticizes the existing sustainability rankings of universities from the position of paying little attention to indicators of education for sustainable development. Stakeholders consider indicators of education for sustainable development to be important, while the existing ranking methodologies do not allow for ensuring a high level of validity and identification of such university practices. THE IR is subject to separate criticism, which, according to scientists, has serious flaws in the methodology and offers a distorted view of the sustainability of higher educational institutions (Bautista-Puig et al., 2022). Moreover, all rating measurements, including those devoted to the contribution of universities to the achievement of SDGs, must comply with the Berlin principles for rating institutions of higher education (IREG, 2006), and in this context, the UI GreenMetric rankings are also not ideal (Galleli et al., 2022).

Even though the UI GreenMetric methodology takes publication activity into account only at the level of 2% in the overall assessment, a study (Sari et al., 2023) showed a positive correlation between the results of individual universities in this ranking, the number of scientific publications and the commitment of universities to sustainable development practices. Another study of the publishing activity of universities emphasizes the need to carefully evaluate existing SDG rating tools, as there are significant differences in the results and rankings of countries using different approaches to the analysis of publications devoted to SDGs (Armitage et al., 2020).

In general, the methodologies of university rankings regarding sustainable development, in particular, UI GreenMetric, and directly the list of indicators used to evaluate institutions of higher education, can be the basis for the development of effective management decision-making tools for the administration of these institutions. It also becomes possible to create corresponding calculations of “green” indices of universities using fuzzy logic models (Karasan et al., 2023). In one of the studies on university participation in the UI GreenMetric ranking, a synthetic DEA-GreenMetric indicator was developed to rank universities based on their contribution to sustainability. The largest number of US and UK universities were found to be actively involved in all aspects of sustainable development. The study highlights the need for universities to focus on improving the efficiency of energy, water, and waste management (Puertas & Marti, 2019).

It has also been proven that “green” university practices have a positive effect on the results of universities in traditional rating measurements of academic performance (Atici et al., 2021). Moreover, the appearance of university rankings on sustainable development, in particular THE IR, became an incentive for higher educational institutions to implement new environmental and social projects for sustainable development (Hansen et al., 2021). Scientists insist that the aspect of sustainability can be considered one of the important factors that should be included in university ranking methodologies. And it is precisely this trend that has been monitored recently: the indicator for the contribution of university research to the implementation of SDGs appeared in the methodology of the national ranking of Polish universities (Perspektywy, 2023), as well as the SCImago Institutions Rankings (SCImago Institutions Rankings, 2024).

Today, the situation is such that universities’ contributions to achieving sustainable development vary between institutions and countries, and reporting on such activities is unsystematic (Hong et al., 2023). Given the fact that the practice of publishing integrated reports (or reports on sustainable development) is currently not widespread enough in the field of higher education, the results of university rankings can serve as a relevant da-

tabase for conducting a comprehensive assessment of the contribution of higher educational institutions of different countries to achieving SDGs.

This paper aims to identify the existing relationship between the sustainable development activities of universities, as reflected by THE IR, and the progress towards achieving the SDGs of the countries in which these universities operate. As part of the study, the following hypotheses were formulated:

- H1: *There is a positive impact of university’s activities, evaluated through the prism of the THE IR rating methodology, on the progress of the country in which the university operates in terms of achieving the SDGs.*
- H2: *There is a positive effect of university’s effectiveness in achieving certain SDGs, according to the THE IR rating methodology, on the progress of the respective SDGs of the country in which the university operates.*

## 2. METHODOLOGY

This study uses the THE IR database with the results of the annual world ranking of universities, which provides a normalized assessment of university activities according to each of the SDGs (Times Higher Education, 2023c). This made it possible to select the countries presented in this ranking based on the results of the activities of universities operating in them in 2017–2021. At the same time, a lag of 2 years was taken into account, which reflects the difference between the year of publication of the ranking and the reporting year, which was used to collect statistical data of universities participating in the ranking. Despite its criticisms, THE IR is most relevant to the SDGs because its methodology involves analyzing indicators for each of the SDGs in four broad areas: research, governance, education, and teaching. According to the methodology, universities voluntarily participate in the ranking and can submit data on any number of 17 SDGs, each of which has a separate list of indicators for evaluating university performance. To enter the final ranking table, each university must submit data on the mandatory SDG 17 and at least three other SDGs. If the university submitted data for

more than three SDGs (except SDG 17), its ranking place will be determined by those SDGs for which performance indicators were better. For each SDG, the score is determined in the range from 0 to 100 points. Therefore, a university’s overall score will be determined taking into account that SDG 17 accounts for 22 percent of the total score, and each of the other three SDGs accounts for 26 percent. As a result, the overall score is averaged based on the results of the last two years of the university’s participation in the ranking (Times Higher Education, 2023c). One of the advantages of the ranking and the main factor in choosing THE IR for this study is that, in addition to the overall ranking score, Times Higher Education publishes the ranking results for each individual SDG.

To assess the progress of countries in achieving the SDGs, the Sustainable Development Report (Sachs et al., 2023) was used, which evaluates both the general index for each country and each goal separately. The characteristics of the input data within the two research hypotheses of this study are shown in Table 2. The distribution of countries analyzed at each level is systematized in Appendix A. The distribution of countries by geographic regions was carried out according to the Sustainable Development Report classification. STATA SE12.0 software package was used to conduct the study.

The results of THE IR 2023 were taken into account to conduct research on individual SDGs. According to this, for SDGs 3, 7, 8, 11, 12, 16, and 17, the median assessment value for a sample of all universities in the world exceeded 50 points. In particular, SDG 16, “Peace, Justice and Strong Institutions,” received the highest rating.

Correlation analysis and robust regression were used to understand and model the complex relationships between THE IR and the SDG progress index, as well as to account for the possible effects of outliers in the data. Correlation analysis serves to determine the degree of linear relationship between variables, which is calculated according to the formula:

$$r = \frac{n \cdot \sum X_i \cdot Y_i - \sum X_i \cdot \sum Y_i}{\sqrt{[n \cdot \sum X_i^2 - (\sum X_i)^2] \cdot [n \cdot \sum Y_i^2 - (\sum Y_i)^2]}}, \quad (1)$$

where  $X_i$  and  $Y_i$  are quantitative indicators that are compared;  $n$  is the number of observations.

**Table 2.** Research design

Indicators	Symbol	Data Source	Study period
<b>Research hypothesis 1</b>			
THE average score	thesc	THE IR	2017–2021
Overall SDG score	unsdgsc	Sustainable Development Reports	2017–2021
<b>Research hypothesis 2</b>			
THE SDG 3 score	thesdg3	THE IR	2021
THE SDG 7 score	thesdg7		
THE SDG 8 score	thesdg8		
THE SDG 11 score	thesdg11		
THE SDG 12 score	thesdg12		
THE SDG 16 score	thesdg16		
THE SDG 17 score	thesdg17	Sustainable Development Reports	2021
UN SDG 3 score	unsdg3sc		
UN SDG 7 score	unsdg7sc		
UN SDG 8 score	unsdg8sc		
UN SDG 11 score	unsdg11sc		
UN SDG 12 score	unsdg12sc		
UN SDG 16 score	unsdg16sc		
UN SDG 17 score	unsdg17sc		

Robust regression is used to obtain more reliable statistical estimates of model parameters in situations where the data may not meet the assumptions for a classical regression model. With the robust option, the exact coefficient estimates become the same as in conventional OLS regression, but the standard errors consider issues related to heterogeneity and non-normal distribution.

Both parametric and non-parametric methods (ANOVA and the Kruskal-Wallis equality-of-populations rank test) were used to identify statistically significant differences between indicators by geographic regions of the world using analysis of variance. Parametric methods are based on the assumptions of data distribution and equality of variances, while nonparametric methods do not require these assumptions and use ranks of observations to compare means between groups.

### 3. RESULTS AND DISCUSSION

The study of the first research hypothesis involves the identification of existing relationships between universities’ activities aimed at sustainable development in different regions of the world, which is reflected by the overall ranking score of THE IR, and the progress towards achieving the SDGs for the countries in which these universities operate. Table 3 presents correlation matrix identifying the relationships between the activities of universities on sustainable develop-

ment in 2017–2021, as reflected by the overall THE IR ranking score and the progress towards achieving the SDGs for the countries in which these universities operate. The obtained coefficients are statistically significant, and the level of density between the indicators is direct and average, which indicates the existence of positive causal patterns, the nature of which will be revealed in the next steps.

**Table 3.** Correlation matrix

Year	thesc				
	2017	2018	2019	2020	2021
unsdgsc	0.499*	0.532*	0.373*	0.366*	0.415*

Note: \*  $p < 0.05$ .

The results of five regression models constructed for each analyzed year confirm the previous assumptions (Table 4). The coefficients of the determination indicate a low but acceptable variability of the model; all regression coefficients are statistically significant and positive. In general, an increase in THE IR’s total ranking score by one unit will lead to a corresponding increase in countries’ progress in achieving the SDGs, while this influence has decreased dynamically from 0.246 (in 2017) to 0.202 units (in 2021).

The regional focus makes it possible to reveal additional regularities of the analyzed relationship, the feasibility of which has been confirmed using parametric and non-parametric methods of variance analysis. Table 5 shows the results of using

**Table 4.** Regression models for the influence of universities’ sustainable development activities, as reflected by the overall THE IR ranking score, on the progress towards achieving SDGs of the countries in which these universities operate

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
	2017	2018	2019	2020	2021
thesc	0.246*** (0.0459)	0.257*** (0.0492)	0.214*** (0.0628)	0.179*** (0.0489)	0.202*** (0.0459)
Constant	57.90*** (2.812)	57.26*** (3.195)	59.73*** (3.886)	61.77*** (3.017)	60.86*** (2.730)
Observations	71	79	86	98	103
R-squared	0.250	0.283	0.139	0.134	0.172

Note: \*\*\* p < 0.01, \*\* p < 0.05, and \* p < 0.1. Robust standard errors are in parentheses.

the ANOVA and Kruskal-Wallis equality-of-populations rank test methods on the example of 2021 for *thes* and *unsdgc* indicators. The results also characterize the distribution of sample countries by geographic regions. In particular, Oceania includes only 1 country (Fiji), which makes the analysis insignificant and, therefore, this indicator will be excluded from the model. The largest number of countries in the analyzed sample belongs to the OECD region. The obtained results also show that the difference between the seven groups of regions is statistically significant at the 0.05% level.

Table 6 shows regression models of the impact of universities’ activities on sustainable development, which is reflected by the overall ranking score of

THE IR on the progress towards achieving the SDGs of the countries in which these universities operate, by geographical regions of the world in 2017–2021. The given data show that a low but acceptable variability of the model is also characteristic among the significant regression models. It should be noted that the East and South Asia region in 2017, 2019–2021 had the largest number of statistically significant dependencies of moderate strength. This can be explained by the fact that it was in this region that the UI GreenMetric ranking was launched, which, not only through its methodology but also within the framework of educational and scientific events in the region, actively stimulates universities to implement sustainable development practices.

**Table 5.** Dispersion analysis results for geographical regions according to the overall THE IR ranking score indicators and the progress of countries in achieving the SDGs

1. Summary						
No.	Region	Freq.	thesc		unsdgc	
			Mean	Std.Dev.	Mean	Std.Dev.
1	Eastern Europe and Central Asia	18	42.95	14.65	73.41	7.48
2	East and South Asia	13	50.69	13.48	67.36	4.48
3	LAC	11	45.78	15.88	68.99	6.77
4	MENA	14	55.69	16.03	67.60	3.63
5	OECD	36	65.75	14.25	79.13	4.05
6	Oceania	1	63.25	0.00	72.72	0.00
7	Sub-Saharan Africa	10	45.83	18.21	57.78	5.98
Total		103	54.41	17.325	71.861	8.43

2. Analysis of Variance (ANOVA)						
Indicator		SS	df	MS	F	Prob
thesc	Between groups	8825.83	6	1470.97	6.48	0.000
unsdgc		4536.95	6	756.16	26.70	0.000

3. Kruskal-Wallis equality-of-populations rank test		
Indicator	chi-squared	probability
thesc	27.040	0.000
unsdgc	69.245	0.000



It should be noted that the Sub-Saharan Africa region has the largest coefficients of determination in 2019 and 2020, which indicates the high quality of the models. As the study (IAU, 2011) shows, a lot of universities in this region have many years of experience in solving the problems of sustainable development, and an inherent feature of the projects implemented by higher education institutions in this region is a significant community orientation. For the rest of the countries, there are individual dependencies that are not of a systematic nature. This is

explained by the limitations of THE IR, which does not cover the majority of higher educational institutions in these regions: despite the fact that data submission to THE IR is free for universities, and no minimum requirements are set for the activities of institutions. The data submission process itself is quite resource-intensive and institution administrations often refuse to participate in the rating.

The disclosure of the second research hypothesis involves the analysis of the impact of achieving

**Table 6.** Regression models of the influence of universities’ sustainable development activities, as reflected by the overall THE IR ranking score on the progress towards achieving the SDGs of the countries in which these universities operate: regional dimension

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	Eastern Europe and Central Asia	East and South Asia	LAC	MENA	OECD	Sub-Saharan Africa
<b>2017</b>						
<i>thesc</i>	-0.077 (0.058)	0.214* (0.099)	0.539 (0.242)	-0.152*** (0.046)	0.130* (0.061)	0.134 (0.217)
Constant	77.26*** (3.169)	55.35*** (6.083)	44.48*** (11.45)	73.94*** (3.186)	69.09*** (4.375)	51.77 (14.047)
Observations	8	10	4	13	33	3
R-squared	0.156	0.159	0.707	0.257	0.128	0.162
<b>2018</b>						
<i>thesc</i>	0.303 (0.224)	0.246 (0.148)	0.137 (0.149)	-0.114 (0.139)	0.083 (0.058)	0.445 (0.135)
Constant	57.396*** (11.583)	53.174*** (9.053)	64.170*** (8.335)	72.433*** (7.467)	72.501*** (4.184)	34.387 (7.715)
Observations	10	10	7	13	35	4
R-squared	0.211	0.268	0.216	0.093	0.068	0.841
<b>2019</b>						
<i>thesc</i>	-0.232 (0.279)	0.510*** (0.144)	-0.004 (0.103)	-0.134 (0.086)	0.078 (0.061)	0.276*** (0.023)
Constant	82.802*** (11.345)	39.431*** (7.801)	72.082*** (4.686)	74.827*** (5.472)	73.349*** (4.276)	42.688*** (1.939)
Observations	13	11	8	13	35	6
R-squared	0.049	0.572	0.000	0.226	0.054	0.883
<b>2020</b>						
<i>thesc</i>	0.209 (0.120)	0.213** (0.076)	0.235 (0.130)	-0.099 (0.066)	0.047 (0.047)	0.227** (0.076)
Constant	64.405*** (6.190)	55.461*** (4.849)	57.295*** (7.837)	72.859*** (3.941)	75.674*** (3.342)	44.086*** (3.763)
Observations	17	12	10	14	36	8
R-squared	0.150	0.227	0.331	0.200	0.028	0.609
<b>2021</b>						
<i>thesc</i>	0.151 (0.111)	0.194*** (0.028)	0.224* (0.108)	-0.092 (0.066)	0.071 (0.052)	0.061 (0.109)
Constant	66.946*** (6.137)	57.553*** (1.861)	58.754*** (6.329)	72.729*** (3.952)	74.486*** (3.602)	55.001*** (6.138)
Observations	18	13	11	14	36	10
R-squared	0.087	0.341	0.275	0.165	0.062	0.034

Note: \*\*\* p < 0.01, \*\* p < 0.05, and \* p < 0.1. Robust standard errors are in parentheses.

certain SDGs by universities according to the ranking score of THE IR on the progress of the corresponding SDGs of the country (SDG 3, SDG 7, SDG 8, SDG 11, SDG 12, SDG 16 and SDG 17). Table 7 shows the results of constructed regression models within individual pairs of indicators for 2021. In particular, the results show that there is no statistically significant relationship between the pairs of *thesdg7* and *unsd7sc*, *thesdg17* and *unsd17sc*. The greatest variability of the model was found for SDG 12, and with an increase in the THE IR ranking score due to the activities of universities in achieving it, there is a decrease in overall progress in achieving the SDG. This can be explained by the fact that operational indicators of the THE IR methodology for this SDG relate exclusively to the university campus: the presence of appropriate procurement and waste management policies, the volumes of generated and processed waste for the reporting year, and in comparison with the previous one, etc. At the same time, 2020 was characterized by an abnormally low level of waste generation and processing due to the COVID-19 pandemic. The revival of economic activity and the resumption of business and social activities

in 2021, for example, in Singapore, led to an increase in waste disposal by 10 percent and recycling by 26 percent (NEA, 2022).

Among other things, the achievement of SDGs 3, 8, 11, and 16 by universities according to the ranking score of THE IR will influence the increase in progress towards the respective goals. This may indicate the essential role of universities in the fields of health care, economic growth, development of cities and communities, and strong institutions.

Similarly, to the previous stage, there is a feasibility of researching relationships by separate geographical regions. The results of this regression analysis are shown in Table 8.

The achievement of SDG 3 by universities, which reflects the ranking score of THE IR, affects progress according to the corresponding SDG for OECD countries. THE IR methodology involves considering the indicators of publication activity for each of the SDGs. According to Scopus data, the publications of researchers from the universities of OECD countries are the most cited in the field of medicine.

**Table 7.** Regression models of the influence of individual dimensions of universities' sustainable development activities, as reflected by the partial THE IR ranking score, on the progress towards achieving SDGs of the countries in which these universities operate in 2021

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
	<i>unsdg3sc</i>	<i>unsd7sc</i>	<i>unsdg8sc</i>	<i>unsdg11sc</i>	<i>unsdg12sc</i>	<i>unsdg16sc</i>	<i>unsdg17sc</i>
<i>thesdg3</i>	0.397*** (0.0848)	–	–	–	–	–	–
<i>thesdg7</i>	–	0.132 (0.103)	–	–	–	–	–
<i>thesdg8</i>	–	–	0.224*** (0.0447)	–	–	–	–
<i>thesdg11</i>	–	–	–	0.292*** (0.0839)	–	–	–
<i>thesdg12</i>	–	–	–	–	–0.559*** (0.0973)	–	–
<i>thesdg16</i>	–	–	–	–	–	0.489*** (0.0724)	–
<i>thesdg17</i>	–	–	–	–	–	–	0.0469 (0.0760)
Constant	57.75*** (4.650)	65.42*** (4.927)	64.58*** (2.328)	65.17*** (4.795)	101.1*** (5.094)	42.29*** (4.005)	60.53*** (4.110)
Observations	98	83	93	82	76	93	103
R-squared	0.168	0.020	0.176	0.124	0.336	0.300	0.004
R	0.410	0.141	0.419	0.352	–0.579	0.548	0.064

Note: \*\*\* p < 0.01, \*\* p < 0.05, and \* p < 0.1. Robust standard errors are in parentheses.

The achievement of SDGs by 7 universities, reflected in the ranking score of THE IR, affects the progress of the corresponding SDG for the countries of East and South Asia. This can be explained by the rapid development of renewable energy in this region and the corresponding role of universities. In 2023, the capacity of solar and wind energy in the countries of Southeast Asia (ASEAN) increased by 20% and exceeded 28 GW in total (CarbonBrief, 2024).

The achievement of SDG 8 by universities, which reflects the ranking score THE IR, affects the progress according to the corresponding SDG for the countries of Eastern Europe and Central Asia, East and South Asia, MENA, and OECD and is related to the key role of universities in preparing highly qualified personnel for the labor market and economic growth.

The achievement of SDG 11 by universities, which reflects the ranking score of THE IR, affects prog-

ress on the corresponding SDG for the countries of Eastern Europe and Central Asia and East and South Asia, where universities are often city-forming organizations and directly influence the development of cities and communities in which they are functioning.

The achievement of SDG 12 by universities, which reflects the ranking score of THE IR, affects progress according to the corresponding SDG for MENA, and OECD countries. Despite the anomalies of 2020 related to the COVID-19 pandemic, the role of universities in researching responsible consumption technologies cannot be overstated.

The achievement of SDG 16 by universities, which reflects the THE IR ranking score, affects progress according to the corresponding SDG for the countries of East and South Asia, OECD, and Sub-Saharan Africa, in which universities have a significant impact on the formation of strong institutions.

**Table 8.** Regression models of the impact of individual dimensions of universities’ sustainable development activities, as reflected by the partial THE IR ranking score, on the progress towards achieving SDGs of the countries in which these universities operate in 2021: regional dimension

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	E. Europe & C. Asia	East & South Asia	LAC	MENA	OECD	Sub-Saharan Africa
<i>thesdg3</i>	0.135 (0.102)	0.133 (0.259)	0.396 (0.245)	0.229 (0.169)	0.212*** (0.054)	0.0293 (0.132)
Constant	70.67*** (3.419)	63.11*** (12.467)	51.62*** (14.852)	67.57*** (8.523)	78.52*** (3.706)	48.22*** (9.929)
Observations	16	13	9	14	36	9
R-squared	0.046	0.028	0.262	0.109	0.243	0.002
<i>thesdg7</i>	-0.037 (0.269)	0.616*** (0.205)	0.162 (0.192)	0.046 (0.101)	0.141 (0.093)	-0.043 (0.186)
Constant	69.58** (9.5644)	28.343** (10.641)	72.062** (6.491)	65.603** (4.544)	72.73** (4.335)	47.05** (6.684)
Observations	14	11	6	12	35	4
R-squared	0.001	0.561	0.117	0.019	0.034	0.007
<i>thesdg8</i>	0.227** (0.058)	0.217*** (0.076)	-0.023 (0.087)	0.275*** (0.099)	0.301*** (0.086)	0.075 (0.086)
Constant	66.617*** (2.415)	62.26*** (4.931)	76.08*** (3.957)	53.07*** (4.529)	64.59*** (5.531)	65.92*** (4.943)
Observations	15	13	9	13	35	7
R-squared	0.558	0.217	0.009	0.321	0.308	0.049
<i>thesdg11</i>	-0.102** (0.037)	0.628** (0.300)	-0.003 (0.182)	-0.154 (0.206)	0.112 (0.067)	0.339 (0.592)
Constant	86.419*** (1.397)	44.241 (16.28)	74.92*** (8.89)	74.668 (10.34)	81.73 (4.67)	40.39 (21.27)
Observations	13	12	7	12	34	35
R-squared	0.249	0.195	0.000	0.043	0.069	0.093
<i>thesdg12</i>	-0.193 (0.223)	-0.110 (0.237)	-0.259 (0.169)	-0.637** (0.225)	-0.397** (0.165)	-0.088 (0.131)

**Table 8 (cont.).** Regression models of the impact of individual dimensions of universities’ sustainable development activities, as reflected by the partial THE IR ranking score, on the progress towards achieving SDGs of the countries in which these universities operate in 2021: regional dimension

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	E. Europe & C. Asia	East & South Asia	LAC	MENA	OECD	Sub-Saharan Africa
Constant	87.89*** (7.151)	92.58*** (12.983)	93.59*** (7.215)	106.94*** (8.475)	84.68*** (10.381)	96.08*** (2.454)
Observations	10	10	6	12	34	4
R-squared	0.078	0.022	0.345	0.358	0.236	0.081
<i>thesdg16</i>	0.134 (0.107)	0.302** (0.115)	0.289 (0.253)	0.242 (0.137)	0.389** (0.167)	0.280* (0.140)
Constant	63.52*** (5.387)	42.58*** (6.214)	41.09*** (8.877)	55.32*** (6.469)	55.21*** (11.246)	36.87*** (4.968)
Observations	14	13	9	13	35	8
R-squared	0.149	0.347	0.159	0.209	0.143	0.211
<i>thesdg17</i>	-0.193 (0.202)	-0.221 (0.161)	0.360*** (0.109)	-0.522** (0.160)	0.159 (0.101)	0.292 (0.236)
Constant	73.77** (9.32)	65.68** (8.01)	46.42** (5.23)	89.87** (8.24)	58.59** (6.34)	35.58** (11.46)
Observations	18	13	11	14	36	10
R-squared	0.053	0.151	0.361	0.294	0.053	0.243

Note: \*\*\* p < 0.01, \*\* p < 0.05, and \* p < 0.1. Robust standard errors are in parentheses.

The achievement of SDG 17 by universities, which reflects the ranking score of THE IR, affects the progress according to the corresponding SDG for the countries of LAC and MENA, in which, according to the THE IR methodology, the practices of cooperation between universities and local non-governmental organizations, intersectoral partnership, implementation of educational projects for the local community are widespread.

The obtained regularities are also confirmed by the best practices of higher educational institu-

tions, which make a significant contribution to achieving SDGs (Table 9).

This study is one of the first attempts to empirically prove the role of higher educational institutions in achieving the SDGs through modeling the relationship between the results of their participation in international rankings of universities for sustainable development and progress in achieving the SDGs of the countries in which these universities operate. Despite a number of methodological limitations of THE IR (Bautista-Puig et al., 2022),

**Table 9.** Examples of higher education institutions’ best practices by world region

Region	Most relevant SDGs	Best practices of universities to achieve SDGs
Eastern Europe and Central Asia	8, 11	The University of Bucharest (Romania) is implementing the project “Students Today, Entrepreneurs Tomorrow” to support business initiatives of students and graduates (University of Bucharest, 2024)
East and South Asia	7, 8, 11, 16	In Indonesia, about 100 academic communities from 50 leading universities and public research centers formed a national platform on SDGs (UNDP Indonesia, 2019)
LAC	17	The University of Buenos Aires implemented the “Red GEO” project, which provides for the creation of an open platform for the cooperation of entrepreneurs and “green” companies in Argentina (UN Academic Impact, 2023)
MENA	8, 12, 17	Almaaref University (Saudi Arabia) has introduced a “Humanitarian and Sustainable Development Hackathon” in which people from different backgrounds come together to develop innovative solutions for sustainable development (UN Academic Impact, 2023)
OECD	3, 8, 12, 16	The University of Manchester (Great Britain) has launched a website on social responsibility and civic engagement. The website contains case studies and focuses on the university’s social responsibility priorities, including thriving communities, improved health, and environmental sustainability (UN Academic Impact, 2023)
Sub-Saharan Africa	16	The University of Johannesburg (South Africa) initiated the African Civil Society Conference, which aims to review the contributions of African civil society and the challenges facing African civil society on the continent (University of Johannesburg, 2024)

this ranking is the most relevant to date, as its methodology is relevant to each of the 17 SDGs. Unlike other studies (Blasco et al., 2020), the authors did not focus on universities in a single country; rather, they examined regional differences in the world by individual SDG.

The study's results fully confirmed Research hypothesis 1 regarding the university's activities in sustainable development in general, assessed through the prism of the THE IR rating methodology. Research hypothesis 2, highlighting universities' achievements on individual SDGs, is partially confirmed, as a statistically significant relationship is found for five of the seven SDGs examined.

At the same time, the study has a number of limitations, the most important of which is that a small number of universities from the respective countries participate in THE IR. Moreover, many of the world's leading universities with significant sustainability achievements do not submit data for participation in THE IR. Also, as part of research hypothesis 2, the study was limited to only seven SDGs, for which the contribution was the largest, according to THE IR 2023. In the future, it is planned not only to take into account the data of the new editions of THE IR in 2024 and subsequent years but also to investigate the relationship between the performance of universities on sustainable development and the progress of the countries in which they operate for each of the 17 SDGs.

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## CONCLUSIONS

The results obtained indicate the existence of a direct positive relationship between the results of the universities' activities on sustainable development in different regions of the world, which is reflected by the ranking score of THE IR, and the progress of the countries in which these universities operate in achieving the SDGs. This proves, among other things, the important role of higher educational institutions in achieving the SDGs through scientific research, education for sustainable development, building "green" campuses, cooperation with various groups of stakeholders, and direct impact on the cities and communities in which these universities operate. The role of universities is special in the field of health care, economic growth, and development of cities, communities, and strong institutions, which was proven in the process of modeling within the framework of research hypothesis 2 by identifying a significant connection between ranking scores of THE IR and the progress of countries according to SDGs 3, 8, 11, and 16.

It was also found that in different regions of the world, the results of universities' activities on sustainable development and their contribution to progress towards achieving the SDGs of the respective countries vary significantly. For OECD countries, the most significant connection between the ranking scores of THE IR and their progress in sustainable development was found within the framework of SDGs 3, 8, 12, and 16; for the countries of Eastern Europe and Central Asia – TSR 8 and 11; for the countries of East and South Asia – 7, 8, 11, and 16; for MENA countries – 8, 12, and 17. SDG 16 for Sub-Saharan Africa is one that higher educational institutions in this region help to achieve, as is SDG 17 for LAC countries.

Examples of cooperation projects with other HEIs, local communities, and businesses were identified among the best practices of universities in the field of sustainable development. These practices reflect key aspects of universities' activities in the field of sustainable development, namely the promotion of the creation of strong institutions and new platforms for the partnership of different stakeholder groups. These efforts are aimed at achieving SDGs 16 and 17, which, according to the study, are most characteristic for most regions of the world in terms of the contribution of universities to sustainable development.

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## APPENDIX A

**Table A1.** Distribution of sample countries within the study for research hypothesis 1

Model	Model 1	Model 2	Model 3	Model 4	Model 5
Years	2017	2018	2019	2020	2021
General observations*	71	79	86	98	103
Eastern Europe and Central Asia	8	10	13	17	18
East and South Asia	10	10	11	12	13
LAC	4	7	8	10	11
MENA	13	13	13	14	14
OECD	33	35	35	36	36
Sub-Saharan Africa	3	4	6	8	10

Note: \* – countries represented in THE IR for the respective year.

**Table A2.** Distribution of sample countries within the study for research hypothesis 2

Model	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Indicator	unsdg3sc	unsd7sc	unsdg8sc	unsdg11sc	unsdg12sc	unsdg16sc	unsdg17sc
General observations*	98	83	93	82	76	93	103
Eastern Europe and Central Asia	16	14	15	13	10	14	18
East and South Asia	13	11	13	12	10	13	13
LAC	9	6	9	7	6	9	11
MENA	14	12	13	12	12	13	14
OECD	36	35	35	34	34	35	36
Sub-Saharan Africa	9	4	7	35	4	8	10

Note: \* – countries represented in THE IR for the respective year.