



## The Impact of UI GreenMetric Involvement on Universities' Performance in Shaping a Sustainable Campus

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**Abstract.** UI GreenMetric was established before the initiative of the Sustainable Development Goals and other ranking to encourage universities in achieving sustainable development through their early awareness of environmental management on campus. In 2019, Times Higher Education launched a new ranking, namely the THE Impact Rankings, that assessed Sustainability progress implementation on campus. In this paper, we evaluate the impact of the consistency of university that have been participated in UI GreenMetric World University Rankings (UIGWUR) since 2010 to 2021. We evaluate 36 universities on the correlation between good performance in UIGWUR to the THE Impact ranking performed by 2019-2021. The results reveal that UI GreenMetric as an assessment tool, helped those universities in terms of shaping university readiness to achieve sustainable development. Those universities compete through annual reporting and the provided evidence of their progress on UI GreenMetric. Moreover, some universities have a high commitment to become sustainable campus through participating in sustainability-related rankings to monitor their progress regardless of the ranking results.

**Keyword:**

Assessment tool, Sustainable campus, Sustainable Development Goals, UI GreenMetric

### 1. Introduction

UI GreenMetric World University Rankings (UIGWUR) was launched in 2010 and was influenced by many factors such as idealism, existing models, realities and challenges, and expert advisory. The first version has 5 criteria i.e., settings and infrastructure, energy and climate change, waste, water, and transportation [1]. In 2012, UI GreenMetric evaluate 6 categories and 51 indicators. These questions have revised in the 2022 version to include the adjustment of the current pandemic condition. There is a new indicator related to water

pollution [guideline UIGM 2022]. The UIGWUR ranking has been recognized as the best available and easy-to-use campus sustainability ranking tool due to its global acceptance among universities [2]. UIGWUR has many programs, for example, International Workshop on UI GreenMetric, that provides an opportunity for universities to share their best practices in sustainable management on campus that other universities may use or emulate [3]. The implementation of sustainable development practices in universities based on the specific characteristic of each university is more impactful rather than research [4]. Environmental awareness affects university rankings and environmental sustainability can serve as a competitive advantage for universities worldwide [5].

The Sustainable Development Goals (SDGs) were established in 2015 by the United Nations General Assembly (UN-GA) [6]. They are aimed to be accomplished by 2030. In 2019, Times Higher Education release a new ranking called THE Impact Ranking to measure university progress in the implementation of SDGs in university for the first time. The first version of THE Impact ranking only covers 10 SDGs i.e. SDG3: Good Health and Wellbeing; SDG4: Quality Education; SDG5: Gender Equality; SDG8: Decent Work and Economic Growth; SDG9: Industry, Innovation, and Infrastructure; SDG10: Reduced Inequalities; SDG11: Sustainable Cities and Communities; SDG12: Responsible Consumption and production; SDG13: Climate Action; dan SDG16: Peace, Justice, and Strong Institutions.

This paper aims to analyze the impact of the UI GreenMetric ranking on university readiness in implementing Sustainable Development on campus organized as follows, describes the data sets and methodological approaches, results and discusses this paper is the implication of the empirical results.

The issue of environment and sustainability is one of the issues that will continue to exist in this world. To overcome these problems, in year 2000, a conference was held with the result of a declaration of "The Millennium Development Goals (MDGs)", particularly in reducing income poverty, providing much-needed access to water and sanitation, reducing child mortality, and drastically improving maternal health. In 2015, the United Nations held a conference which ratified the ready initiated Sustainable Development Goals (SDGs) Agenda. The conference aims to achieve universal common goals that can maintain a balance in the three dimensions of sustainable development: environmental, social, and economic [7]. In addition, the initiation of the SDGs is expected to continue and strengthen the previous MDGs achievements.

The Sustainable Development Goals (SDGs) are a set of universal goals, targets, and indicators for sustainable development. The SDGs cover various social, economic, and environmental development issues based on the 2030 Agenda for Sustainable Development or so called 2030 Agenda. In total, 17 Sustainable Development Goals and 169 targets are expected to be achieved over 15 years. These 17 goals will be closely related to global partnerships for developed and developing countries to improve sustainable living. These 17 Goals are awareness of the goal: (1) No Poverty; (2) Zero Hunger; (3) Good Health and Well-Being for people; (4) Quality Education; (5) Gender Equality; (6) Clean Water and Sanitation; (7) Affordable and Clean Energy; (8) Decent Work and Economic Growth; (9) Industry, Innovation, and Infrastructure; (10) Reduced Inequalities; (11) Sustainable Cities and Communities; (12) Responsible Consumption and Production; (13) Climate Action; (14) Life Below Water; (15) Life on Land; (16) Peace, Justice, and Strong Institutions; and (17) Partnerships for the Goals.

In implementing the Sustainable Development Goals (SDGs), universities or academic

institutions have become essential roles in achieving these SDGs. Universities or academic institutions can view, monitor, and measure their research strategies based on the 17 goals of the SDGs. The UI GreenMetric World University Rankings is one of the rankings for universities worldwide focused on green and sustainable campuses. UI GreenMetric was first implemented in 2010 and has been extended into a network of sustainable universities. UI GreenMetric evaluates universities in the world based on six categories, namely, Setting and Infrastructure (SI), Energy and Climate Change (EC), Waste (WS), Water (WR), Transportation (TR), and Education and Research (ED). The six categories of the UI GreenMetric assessment align with several SDGs goals. Setting and Infrastructure (SI) is in line with goals 9 and 11 in SDGs. Energy, and Climate Change is in line with goals 7 and 13 in SDGs. Waste is in line with goals 3 and 14 in SDGs. Water is in line with goals 6 in SDGs. Transportation is in line with goals 13 and 15 in SDGs. Education and Research in line with the goals 4 in SDGs [7].

Besides UI GreenMetric, Times Higher Education Impact (THE Impact) ranks sustainable campuses based on SDGs. THE Impact was first launched in 2019. Unlike UI GreenMetric, THE Impact focuses on the university impact on society, not just research and teaching [8]. THE Impact measures the role of educational institutions based on four pillars: research, stewardship, outreach, and teaching. In the THE Impact ranking, universities will be evaluated based on Goal 17 of the SDGs with a percentage of 22%, as well as three other Goals of the 16 Goal SDGs with the highest points with a weight of 26% each.

## **2. Methodology**

In this study, we used a panel dataset based on six categories from the UI GreenMetric World University Rankings from 2010-2021. The number of universities that participate in UI GreenMetric from 2010-2021 is 1367 universities from 96 countries. Of those universities, there are 36 universities from 17 countries consistently participated in UI GreenMetric from 2010-2021. Thus, the panel variable is university and ranking, and the time variable is in years. These universities were selected as the most consistent university that has been participating in the UI GreenMetric ranking since 2010. This study will focus on the university score rather than their ranking so it could be more practical to analyze the progress that universities have made.

## **3. Result and Discussion**

### **3.1. The performance of the loyal participant in UI GreenMetric World University Ranking**

Table 1 shows that there are 36 universities that consistency participate on UI GreenMetric all though this year and these university kept participating even though the result remains the same, even slightly decreasing. The UI GreenMetric can be seen as a globally alluring sustainability ranking that serves as a reference, guide, and impulse for creating sustainable universities, but above all, a "sustainable future" can be viewed [9].

Table 1. Descriptive statistic result of the UI GreenMetric 2010-2021 – Score

No	Universitas	Country	Score Progress ( $\Delta$ )	Average
1	Universidad de los Andes Colombia	Colombia	4875	5236
2	Politecnico di Torino	Italy	4500	5290
3	King Abdulaziz University	Saudi Arabia	4217	5895
4	Politecnico di Milano	Italy	3708	5813
5	Brawijaya University	Indonesia	3488	4863
6	American University of Beirut (AUB)	Lebanon	3180	4731
7	IPB University	Indonesia	3068	6715
8	Universitas Syiah Kuala	Indonesia	3023	3877
9	Universitas Islam Indonesia	Indonesia	2889	5702
10	University of Szeged	Hungary	2659	6481
11	Universidade de Sao Paulo USP	Brazil	2567	6191
12	Telkom University	Indonesia	2554	5218
13	Universitas Pancasila	Indonesia	2438	4109
14	Pontificia Universidad Catolica Del Perú	Peru	2413	4596
15	Universitas Riau	Indonesia	2357	4506
16	Universitas Negeri Semarang	Indonesia	2275	6457
17	Universitas Lampung	Indonesia	2202	5036
18	National Cheng Kung University	Taiwan	1749	5966
19	Universidade de Santiago de Compostela	Spain	1666	5163
20	Universitat Politècnica de València	Spain	1660	6273
21	Universitas Indonesia	Indonesia	1574	7053
22	Universiti Teknologi Malaysia	Malaysia	1515	6198
23	Institut Teknologi Sepuluh Nopember	Indonesia	1458	6468
24	Universidad de Alcalá	Spain	1336	7123
25	Tadeusz Kosciuszko Cracow University of Technology	Poland	1089	3164
26	King Mongkut's University of Technology Thonburi	Thailand	1040	6300
27	Universiti Putra Malaysia	Malaysia	726	7196
28	Bilkent University	Turkey	724	3509
29	University of Nottingham	United Kingdom	648	8060
30	Universitat de Valencia	Spain	577	5664
31	Pontificia Universidade Catolica Do Rio De Janeiro Puc-rio	Brazil	564	5384
32	Washington University Saint Louis	United States	373	6965
33	University of Bengkulu	Indonesia	46	4891
34	Escuela Superior Politecnica del Litoral	Ecuador	-46	6036
35	Universitas Surabaya	Indonesia	-336	3790
36	Universidade Federal de Sao Paulo	Brazil	-1128	3840

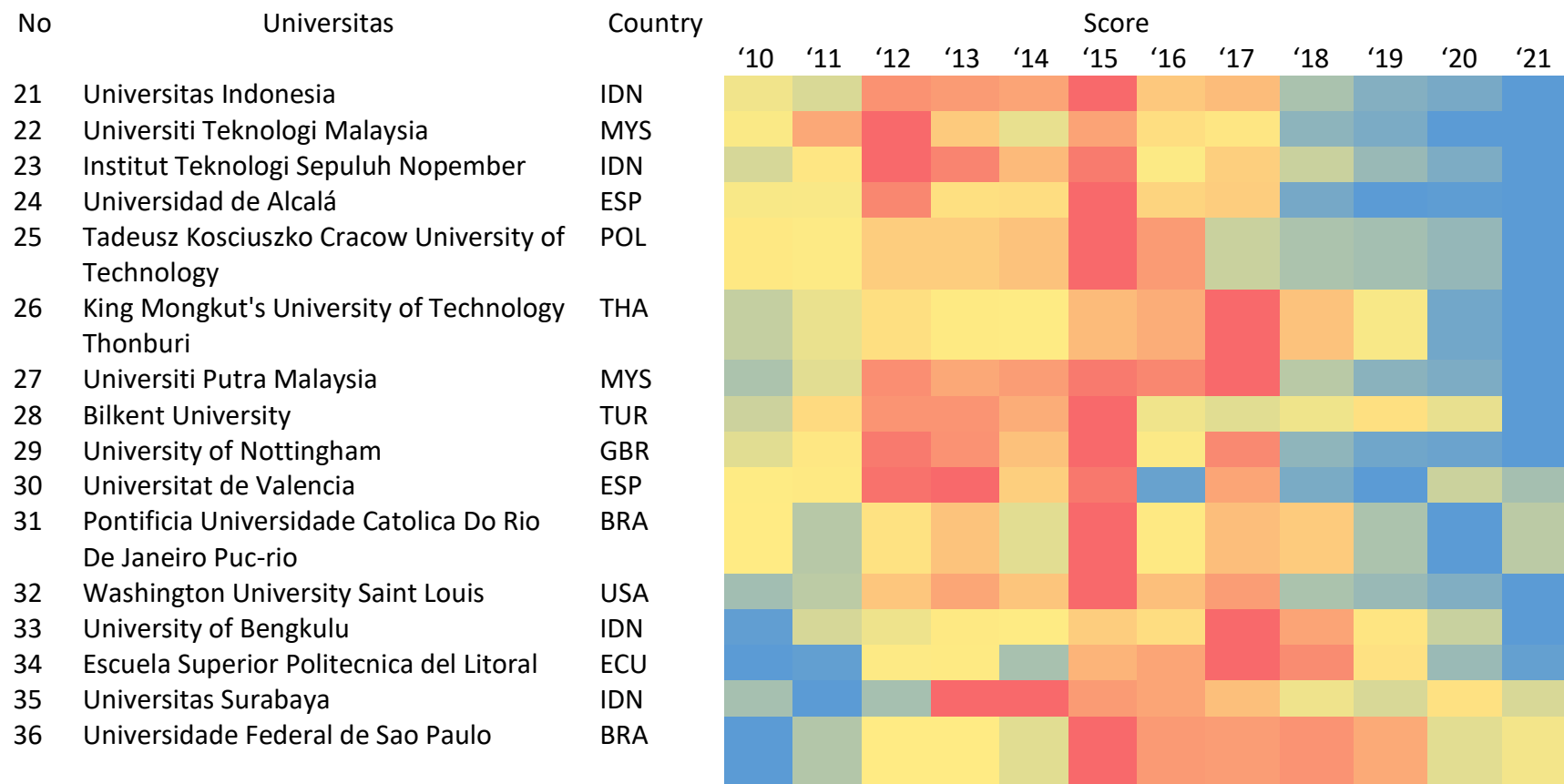
There are thirty-six university who consistence participated in UIGWUR. More than 90% of these universities have a positive trend and three of them have negative trend.

Universidad de los Andes Colombia, Politecnico di Torino, and King Abdulaziz University have impressive performance that from 2010-2021 have delta score more than 400. There are also university that have a negative trend they are Escuela Superior Politecnica del Litoral, Universitas Surabaya, and Universidade Federal de Sao Paulo.

However, the university keeps monitoring its progress through its report submitted on UI GreenMetric annually. The purpose of the UIGWUR to encourage the university awareness of the sustainability issue can be understood by the participants so they keep reporting their effort on sustainability through UIGWUR online questionnaire despite their score or rank caused their limitation on the implementation.

Table 2. The performance of the loyal participants on UI GreenMetric – Heat Map Chart

No	Universitas	Country	Score										
			'10	'11	'12	'13	'14	'15	'16	'17	'18	'19	'20
1	Universidad de los Andes Colombia	COL	Red	Red	Orange	Orange	Yellow	Yellow	Yellow	Green	Green	Blue	Blue
2	Politecnico di Torino	ITA	Orange	Red	Orange	Orange	Orange	Red	Yellow	Yellow	Green	Green	Blue
3	King Abdulaziz University	SAU	Orange	Red	Orange	Orange	Orange	Yellow	Yellow	Green	Green	Blue	Blue
4	Politecnico di Milano	ITA	Red	Yellow	Orange	Orange	Orange	Orange	Yellow	Orange	Green	Green	Blue
5	Brawijaya University	IDN	Orange	Red	Red	Red	Red	Orange	Green	Green	Green	Blue	Blue
6	American University of Beirut (AUB)	LBN	Yellow	Green	Yellow	Yellow	Yellow	Orange	Red	Red	Orange	Green	Blue
7	IPB University	IDN	Red	Yellow	Yellow	Yellow	Yellow	Orange	Orange	Orange	Green	Blue	Blue
8	Universitas Syiah Kuala	IDN	Yellow	Red	Red	Red	Red	Red	Yellow	Yellow	Green	Green	Blue
9	Universitas Islam Indonesia	IDN	Orange	Yellow	Red	Red	Yellow	Orange	Yellow	Yellow	Green	Blue	Blue
10	University of Szeged	HUN	Red	Orange	Orange	Yellow	Green	Yellow	Orange	Orange	Green	Blue	Blue
11	Universidade de Sao Paulo USP	BRA	Yellow	Orange	Orange	Orange	Orange	Red	Red	Yellow	Green	Blue	Blue
12	Telkom University	IDN	Yellow	Red	Red	Red	Red	Orange	Yellow	Yellow	Green	Blue	Blue
13	Universitas Pancasila	IDN	Green	Yellow	Orange	Orange	Orange	Red	Red	Orange	Yellow	Green	Blue
14	Pontificia Universidad Catolica Del Perú	PER	Red	Green	Orange	Orange	Yellow	Orange	Yellow	Yellow	Green	Blue	Blue
15	Universitas Riau	IDN	Orange	Red	Red	Yellow	Yellow	Orange	Yellow	Yellow	Green	Blue	Blue
16	Universitas Negeri Semarang	IDN	Yellow	Orange	Red	Yellow	Yellow	Orange	Orange	Green	Green	Blue	Blue
17	Universitas Lampung	IDN	Green	Yellow	Orange	Yellow	Yellow	Red	Red	Red	Orange	Green	Blue
18	National Cheng Kung University	TWN	Green	Orange	Yellow	Yellow	Yellow	Orange	Red	Orange	Green	Green	Blue
19	Universidade de Santiago de Compostela	ESP	Orange	Orange	Yellow	Green	Green	Red	Red	Red	Yellow	Yellow	Blue
20	Universitat Politècnica de València	ESP	Red	Green	Orange	Orange	Yellow	Orange	Red	Red	Red	Green	Blue



Notes:



The progress of each university's total score per year can be visualized using a Heat Map Chart, as shown in Figure 1. As shown in the chart, the compared scores are the total scores of each university that has participated in the UI GreenMetric from 2010–2021. The red color indicates the minimum score by each university and vice versa, and the blue color indicates the maximum score for each university.

In Figure 1, from 2010 to 2017, the average university experienced fluctuations in the total score. Some universities do not always experience an increase in scores for several years continuously but also experience a decrease in scores which can be seen that the heatmap pattern formed during those years tends to be random. In 2010 some universities started with a yellow heatmap chart and then turned orange

or even red a few years later. In 2015, it can be seen that the majority of university heatmap charts were trend orange to red.

In contrast, the 2018–2021 range shows that the majority of universities experience an increase in sustainability on the university, as indicated by an increase in the total score achieved during that time range, which is indicated by the heatmap chart color pattern that turns blue every year. The difference in the progress of the total score are due to some change in the questionnaire and the pandemic condition faced by universities.

During 2010–2017, several question indicators in the UI GreenMetric questionnaire contained numbers or values to be submitted. The minimum and maximum values for the questions filled out by participating universities are determined from these numbers. Then the university will get a score based on the value that has been submitted compared to the minimum and maximum values of participating universities. The university may have shown progress or development every year in sustainability, but compared to that, some universities are far better in progress or development, and the total score achieved does not increase significantly and sometimes decrease. In 2018, all questions of the UI GreenMetric questionnaire are consist five options of answer with a definite score and thus possible to monitor how university are progressing in their sustainability performance.

UI GreenMetric started to rank universities around the globe since 2010 and annually the questionnaire refined, whereas the 2021 questionnaire was the 12th version of UI GreenMetric rankings. In the first year, 95 universities from 35 countries in the world joined UI GreenMetric, and by 2021 this number reached 956 universities from 80 countries. The total number of universities participating in the UI GreenMetric ranking from 2010 to 2021 is 1367 universities worldwide, although dynamically some universities joined and resigned.

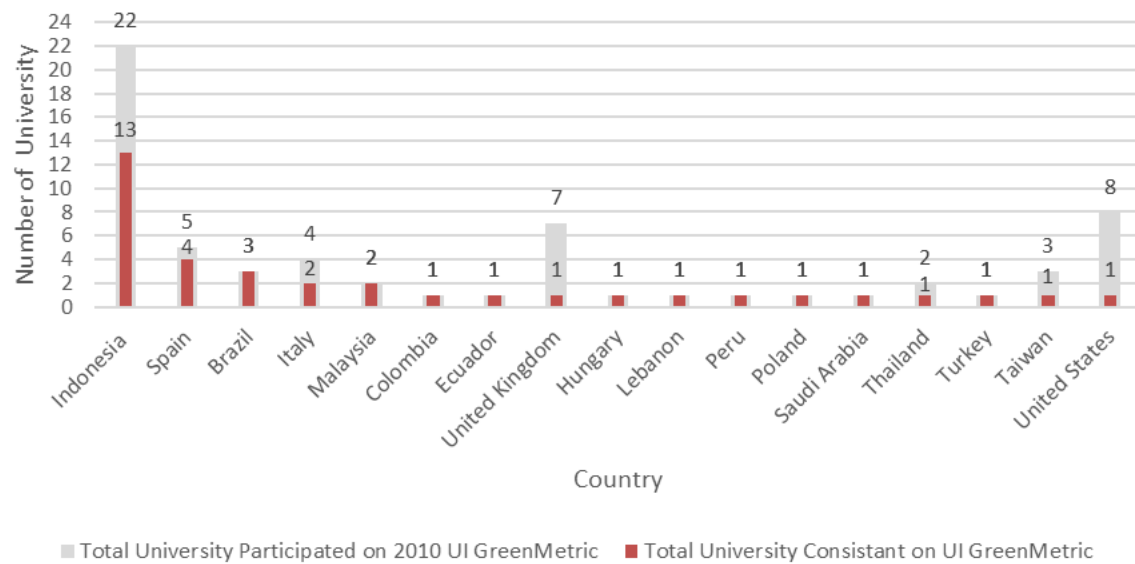


Figure 1. The Most Consistent Universities on UI GreenMetric by Country

As shown in Table 1, out of 1367 universities that have participated in UI GreenMetric, only 36 universities, or 2.6% of the total universities from 17 countries, have consistently participated in UI GreenMetric from 2010 to 2021, as can be seen in Figure 2. Indonesia has the highest number of universities consistently participating in UI GreenMetric with 13 universities, followed by Spain and Brazil with 4 and 3 universities, respectively. Italy and Malaysia have two universities that have participated in UI GreenMetric for 12 years. Meanwhile, Colombia, Ecuador, the United Kingdom, Hungary, Lebanon, Peru, Poland, Saudi Arabia, Thailand, Turkey, Taiwan, and the United States have one university that has consistently participated in UI GreenMetric from 2010 to 2021.

When the number of universities that have consistently participated in UI GreenMetric from 2010-2021 is compared to the number of universities participating in UI GreenMetric in 2010. There are ten countries whose universities have always participated in UI GreenMetric from the beginning. The ten countries include Brazil, Malaysia, Colombia, Ecuador, Hungary, Lebanon, Peru, Poland, Saudi Arabia, and Turkey. In the 2010 ranking, five universities from Spain participated, but only four (80%) consistently participated in UI GreenMetric until 2021. This is followed by Indonesia with 13 universities (59%) which consistently participated from 22 universities in 2010, Italy with two universities (50%) from 4 universities, Thailand with one from 2 universities, and Taiwan with one from 3 universities. Meanwhile, the United Kingdom and the United States have the lowest percentage of countries with universities that consistently participate in UI GreenMetric, respectively, with one university out of 7 universities in the United Kingdom and one university out of 8 universities in the United States.

The consistent participation in UI GreenMetric is expected to improve the progress/efforts made by universities in the field of sustainability. This can also be seen from the increase in the scores universities which is obtained in the UI GreenMetric ranking for 12 years, that can be seen in Table 1. Of the 36 universities who have consistently participated in UI GreenMetric, the average score increased by 1879, with an average total score of 5549. A total of 33 out of 36 universities (91.67%) have succeeded in improving their assessment scores in UI GreenMetric 2021 when compared to their initial scores in the 2010



ranking, while three universities (8.33%) experienced a decline in their scores in 2021 when compared to their scores in 2010. Universidad de los Andes Colombia, Colombia, is the university with the highest score increase of 4875, followed by Politecnico di Torino, Italy, and King Abdulaziz University, Saudi Arabia, with score increases of 4500 and 4217, respectively. Meanwhile, the three universities that experienced a decrease in the score were Universidade Federal de Sao Paulo, Brazil, with a decline of 1128 points, Universitas Surabaya, Indonesia, with 336 points, and Escuela Superior Politecnica del Litoral, with a decrease in score of 46 points.

### **3.2. University with a high commitment to Sustainable**

A sustainable university can be defined as one that, in addition to seeking academic excellence, tries to incorporate human values into people's lives. In other words, a university that promotes and implements sustainability practices in teaching, research, community outreach, waste and energy management, land planning and land use through an ongoing commitment to monitoring and sustainability. Such an approach could improve the accountability of individuals and promote the expansion of sustainability practices within society [7].

Table 3. UIGWUR Member University Participation in other rankings in 2019-2021

No	Universitas	Negara	UI GreenMetric			THE Impact Ranking			THE World Ranking			QS Ranking		
			'19	'20	'21	'19	'20	'21	'19	'20	'21	'19	'20	'21
1	American University of Beirut (AUB)	Lebanon	ü	ü	ü	ü	ü	ü	ü	ü	ü	ü	ü	ü
2	Bilkent University	Turkey	ü	ü	ü	-		-	ü	ü	ü	ü	ü	ü
3	Brawijaya University	Indonesia	ü	ü	ü	-	ü	ü	-	ü	ü	ü	ü	ü
4	Escuela Superior Politecnica del Litoral	Ecuador	ü	ü	ü	ü	ü	ü	-	-	-	ü	ü	ü
5	Institut Teknologi Sepuluh Nopember	Indonesia	ü	ü	ü	-	ü	ü	ü	ü	ü	ü	ü	ü
6	IPB University	Indonesia	ü	ü	ü	ü	ü	ü	ü	ü	ü	ü	ü	ü
7	King Abdulaziz University	Saudi Arabia	ü	ü	ü	ü	ü	ü	ü	ü	ü	ü	ü	ü
8	King Mongkut's University of Technology Thonburi	Thailand	ü	ü	ü	-	ü	ü	ü	ü	ü	ü	ü	ü
9	National Cheng Kung University	Taiwan	ü	ü	ü	ü	ü	ü	ü	ü	ü	ü	ü	ü
10	Politecnico di Milano	Italy	ü	ü	ü	-	-	-	ü	ü	ü	ü	ü	ü
11	Politecnico di Torino	Italy	ü	ü	ü	-	-	ü	ü	ü	ü	ü	ü	ü
12	Pontificia Universidad Catolica Del Perú	Peru	ü	ü	ü	ü	ü	ü	ü	ü	ü	ü	ü	ü
13	Pontificia Universidade Catolica Do Rio De Janeiro Puc-rio	Brazil	ü	ü	ü	-	-	-	-	-	-	ü	ü	ü
14	Tadeusz Kosciuszko Cracow University of Technology	Poland	ü	ü	ü	-	-	-	-	-	-	-	-	-
15	Telkom University	Indonesia	ü	ü	ü	-	-	ü	-	-	ü	-	-	-
16	Universidad de Alcalá	Spain	ü	ü	ü	-	ü	ü	ü	ü	ü	ü	ü	ü
17	Universidad de los Andes Colombia	Colombia	ü	ü	ü	-	-	-	ü	ü	ü	ü	ü	ü

No	Universitas	Negara	UI GreenMetric			THE Impact Ranking			THE World Ranking			QS Ranking		
			'19	'20	'21	'19	'20	'21	'19	'20	'21	'19	'20	'21
18	Universidade de Santiago de Compostela	Spain	ü	ü	ü	-	-	-	ü	ü	ü	ü	ü	ü
19	Universidade de Sao Paulo USP	Brazil	ü	ü	ü	-	ü	ü	ü	ü	ü	ü	ü	ü
20	Universidade Federal de Sao Paulo	Brazil	ü	ü	ü	ü	ü	ü	ü	ü	ü	ü	ü	ü
21	Universitas Indonesia	Indonesia	ü	ü	ü	ü	ü	ü	ü	ü	ü	ü	ü	ü
22	Universitas Islam Indonesia	Indonesia	ü	ü	ü	-	-	-	-	-	-	-	-	-
23	Universitas Lampung	Indonesia	ü	ü	ü	-	-	ü	-	-	-	-	-	-
24	Universitas Negeri Semarang	Indonesia	ü	ü	ü	-	-	-	-	-	-	-	-	-
25	Universitas Pancasila	Indonesia	ü	ü	ü	-	-	-	-	-	-	-	-	-
26	Universitas Riau	Indonesia	ü	ü	ü	-	-	-	-	-	-	-	-	-
27	Universitas Surabaya	Indonesia	ü	ü	ü	-	-	-	-	-	-	-	-	-
28	Universitas Syiah Kuala	Indonesia	ü	ü	ü	-	-	-	-	-	-	-	-	-
29	Universitat de Valencia	Spain	ü	ü	ü	ü	ü	ü	ü	ü	ü	ü	ü	ü
30	Universitat Politècnica de València	Spain	ü	ü	ü	ü	ü	ü	ü	ü	ü	-	-	-
31	Universiti Putra Malaysia	Malaysia	ü	ü	ü	ü	ü	ü	ü	ü	ü	ü	ü	ü
32	Universiti Teknologi Malaysia	Malaysia	ü	ü	ü	ü	ü	ü	ü	ü	ü	ü	ü	ü
33	University of Bengkulu	Indonesia	ü	ü	ü	-	-	-	-	-	-	-	-	-
34	University of Nottingham	United Kingdom	ü	ü	ü	-	-	-	ü	ü	ü	ü	ü	ü
35	University of Szeged	Hungary	ü	ü	ü	ü	ü	ü	ü	ü	ü	ü	ü	ü
36	Washington University Saint Louis	United States	ü	ü	ü	-	-	-	ü	ü	ü	ü	ü	ü

In the Table 2, there are nine universities that only participate on UI GreenMetric World University Ranking. They are Tadeusz Kosciuszko Cracow University of Technology, Universitas Islam Indonesia, Universitas Lampung, Universitas Negeri Semarang, Universitas Pancasila,

Universitas Riau, Universitas Surabaya, and Universitas Syiah Kuala.

Several universities have shown a high commitment to sustainability, especially by participating in sustainability rankings such as the UI GreenMetric and THE Impact Ranking. In 2021, Universitas Lampung is a university which is only focus on ranking in sustainability i.e., UI GreenMetric and THE Impact Ranking, and have not participated in the academic rankings.

Telkom University and Brawijaya University are the universities who start participated on THE World Ranking after participated in UI GreenMetric and THE Impact Ranking.

The one of those universities that participated in UI GreenMetric rankings first, followed by another sustainability-related rankings and academic-based ranking. As example, Telkom University and Brawijaya University are the universities who start participated on THE World Ranking after participated in UI GreenMetric and THE Impact Ranking. As the stated in the THE Website that THE World Ranking is based on an invitation-only. Through participated on the UIGWUR helps university to provide the complete data for THE Impact ranking and get the remarkable result so they can widely recognize for their achievement. In general, the sustainable campus effort will simultaneously with the quality of the education itself.

Several universities have shown a high commitment to sustainability, especially by participating in sustainability rankings such as the UI GreenMetric and THE Impact Ranking. There are nine universities that only participate on UI GreenMetric World University Ranking. The universities are Tadeusz Kosciuszko Cracow University of Technology, Universitas Islam Indonesia, Universitas Lampung, Universitas Negeri Semarang, Universitas Pancasila, Universitas Riau, Universitas Surabaya, and Universitas Syiah Kuala.

There are two universities which are only focus on ranking in sustainability i.e., UI GreenMetric and THE Impact Ranking, and have not participated in the academic rankings. These universities are Universitas Islam Indonesia dan Universitas Lampung.

Telkom University is the one of those universities that participated in UI GreenMetric rankings first, followed by another sustainability-related rankings and academic-based ranking. Telkom University has participated in the UI GreenMetric since 2010, followed by THE World Rankings, and THE Impact Ranking since 2021.

### **3.3. Contribution of UI GreenMetric Rankings in Shaping Sustainable Campuses to Achieve UN SDGs**

Our study found that implementing UI GreenMetric metrics contributes to the achievement of the United Nations SDGs: SD3, SDG4, SD6, SDG7, SDG8, SDG9, SDG11, SDG12, SDG13 and SD15 [8]. As comparison, THE launched a new ranking in 2019 related SDGs implementation in the university. Both rankings, UI GreenMetric and THE Impact, are the sustainability-related ranking which have significant relationship with the SDGs. Table 3 shows that there are 21 loyal participants in UI GreenMetric which also participated in the THE Impact Ranking.

Table 4. Performance of the UIGWUR's loyal participants in other ranking in 2019-2021

No	Universitas	Negara	UI GreenMetric			THE Impact Ranking		
			2019	2020	2021	2019 [7]	2020 [8]	2021 [9]
1	American University of Beirut (AUB)	Lebanin	5825 (242)	6900 (185)	7475 (162)	53.7–64.5 (201–300)	68.2 - 75.3 (201–300)	86,9 (87)
2	Brawijaya University	Indonesia	5725 (257)	7150 (147)	7450 (166)		68.2 - 75.3 (201–300)	66.3 - 70.9 (301–400)
3	Escuela Superior Politecnica del Litoral	Ecuador	6000 (217)	6700 (211)	7000 (240)	23.8–53.6 (301+)	61.5 – 68 (301–400)	47.6 - 56.5 (601–800)
4	Institut Teknologi Sepuluh Nopember	Indonesia	7550 (59)	7875 (61)	8275 (40)		46.7 - 61.4 (401–600)	88,6 (64)
5	IPB University	Indonesia	7775 (40)	7975 (49)	8225 (46)	53.7–64.5 (201–300)	85,1 (77)	77.5 - 85.2 (101–200)
6	King Abdulaziz University	Saudi Arabia	7700 (44)	8075 (36)	8450 (26)	82,6 (54)	75.4 - 83.3 (101–200)	90,1 (46)
7	King Mongkut's University of Technology Thonburi	Thailand	6350 (158)	7675 (81)	7900 (83)		75.4 - 83.3 (101–200)	89,3 (54)
8	National Cheng Kung University	Taiwan	6550 (134)	7975 (48)	7850 (93)	78 (80)	89,3 (38)	77.5 - 85.2 (101–200)
9	Politecnico di Torino	Italy	7000 (103)	8175 (25)	8500 (20)			66.3 - 70.9 (301–400)
10	Pontificia universidad Catolica Del Perú	Peru	5150 (360)	5425 (431)	5575 (477)	23.8 - 53.6 (301+)	68.2 - 75.3 (201–300)	66.3 - 70.9 (301–400)
11	Telkom University	Indonesia	6550 (135)	7300 (123)	7750 (102)			71.0 - 77.4 (201–300)
12	Universidad de Alcalá	Spain	8200 (19)	8175 (24)	8200 (47)		68.2 - 75.3 (201–300)	71.0 - 77.4 (201–300)
13	Universidade de Sao Paulo USP	Brazil	8225 (18)	8375 (13)	8700 (10)		93,9 (14)	90 (48)
14	Universidade Federal de Sao Paulo	Brazil	3525 (641)	4025 (687)	3900 (776)	64.6 - 75.6 (101–200)	75.4 - 83.3 (101–200)	66.3 - 70.9 (301–400)
15	Universitas Indonesia	Indonesia	8025 (27)	8150 (27)	8450 (24)	78 (80)	88,5 (47)	87 (85)
16	Universitas Lampung	Indonesia	5225 (343)	6325 (258)	7550 (153)			47.6 - 56.5 (601–800)
17	Universitat de Valencia	Spain	6675 (122)	5950 (334)	6200 (373)	64.6 - 75.6 (101–200)	75.4 - 83.3 (101–200)	77.5 - 85.2 (101–200)
18	Universitat Politècnica de València	Spain	6800 (113)	6475 (237)	7300 (186)	64.6 - 75.6 (101–200)	75.4 - 83.3 (101–200)	87,1 (83)
19	Universiti Putra Malaysia	Malaysia	8000 (28)	8125 (28)	8425 (27)	53.7 - 64.5 (201–300)	75.4 - 83.3 (101–200)	71.0 - 77.4 (201–300)
20	Universiti Teknologi Malaysia	Malaysia	7275 (81)	7575 (94)	7575 (49)	64.6 - 75.6 (101–200)	68.2 - 75.3 (201–300)	77.5 - 85.2 (101–200)
21	University of Szeged	Hungary	7375 (74)	7675 (86)	7900 (85)	64.6 - 75.6 (101–200)	75.4 - 83.3 (101–200)	66.3 - 70.9 (301–400)

In 2019, the first edition of THE Impact was published. There are differences on the position of each ranking as each ranking has different questionnaire even with the target of both rankings is achieving SDGs. Table 3., shows that 13 out of 21 take a part on that THE Impact Ranking. These universities have extremely good performance. There are 3 universities in the top 100 i.e., National Cheng Kung University, King Abdulaziz University and Universitas Indonesia. The rest of the universities already achieve 50% of the maximum score in the first edition of the ranking but two of them was in score range 23,8-53,6, i.e., IPB University and Pontificia Universidad Catolica del Perú. These two universities significantly increase their achievement in 2020 and 2021. University can get this achievement because they already design their target and program as green campus based on UI GreenMetric indicator even long before the SDGs was announced in 2015.

In second edition, Brawijaya University, Institut Teknologi Sepuluh Nopember, King Mongkut's University of Technology Thonburi, Universidad de Alcalá, and Universidade de Sao Paulo USP participated on this ranking. These five universities have excellent starting point with the score more than forty percent and even Universidade de Sao Paulo USP has a remarkable result that get the highest score out of the 18 loyal participants of UIGWUR which participated in 2021. In total, there are 18 out of 36 universities participated on THE Impact Ranking. Overall, the universities continue to show progress with the increase the score. National Cheng Kung University, Universidade de Sao Paulo USP and Universitas Indonesia are three universities who get the positions in the top 50.

In 2021, there are 21 universities out of the 36 loyal participants of UIGWUR have been participated in THE Impact ranking. There are 3 addition universities that participated in this year ranking. There are Politecnico di Torino, Telkom University and Universitas Lampung.

In the case of UI GreenMetric Ranking, Telkom University continues to show progress in the field of sustainability every year reflected from the ranking position #135 in 2019, #123 in 2020, and #102 in 2021; this is in line with the total score achieved, which also increased, 6550, 7300, and 7750 respectively from 2019–2021. On the other hand, Telkom University's performance in THE Impact Rankings was ranked #201–300 with a score range of 71.0–77.4.

Universitas Lampung shown significant increased in both scores and rankings in UI GreenMetric since 2019 to 2021 whereas ranked at #343 with a score of 5225 in 2019, raised to ranked #258 with a score of 6325 in 2020 and ranked #153 with a total score of 7550 in 2021. The performance of Universitas Lampung in THE Impact Rankings started with a ranked #601–800 with a score range of 47.6–56.5 in 2021.

The same case for Politecnico di Torino had significant improvemnet in both scores and rankings in UI GreenMetric from 2019 to 2021. In 2019, It ranked #103 with total score 700, then raised to ranked #25 with a score of 8175 in 2020 and ranked #20 with a total score of 8500 in 2021.

In addition, Universitas Islam Indonesia (UII) has just joined the THE Impact Rankings in 2022 and ranked #601–800 with a score range of 57.3–64.9. While in the UI GreenMetric ranking, in term of scores shown an increasing, but in term of position it was decreased; ranked #109 with a score of 6925 in 2019, downgraded to #112 in 2020 and 2021 with a total score of 7375 and 7700 respectively.

#### 4. Conclusions and Recommendations

Nowadays university has a big responsibility to support society, government, and the world to meet the target of Sustainable Development Goals in 2030. Participating in UI GreenMetric helps the university to do its mission which is promoting and enhancing the awareness of the environment with emphasis on social, and environmental sustainability and providing experiences for the student.

It can be seen as the result of THE impact Ranking, the assessment of the implementation of SDGs in university. University that has consistent participation in UI GreenMetric has good results when participating in the first version of THE Impact Ranking. Even though the indicator is wider than UIGWUR, but universities are already concerned about sustainability issues, and they conduct actions and data collection.

The purpose of the UIGWUR to encourage the university awareness on sustainability issues has been collective indirectly acknowledged by the participants so they keep reporting their effort on sustainability through UIGWUR online questionnaire despite their score or rank caused their limitation on the implementation.

It can be read that, some universities only participate in the ranking that evaluates the sustainability implementation in the university that are not measured in other rankings methodology. We insisted that they use rankings to monitor their progress in being a sustainable university.

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