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Green metric sustainability index: Evaluation of Turkish universities in the Top 500 category in 2020

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Abstract

University sustainability activities have become increasingly important as interest in sustainable campuses has grown. Several sustainability indexes, such as University League, Sustainability Tracking, Assessment Rating System, and Green Metric, that increase awareness of sustainability, are used in university evaluations. This study aims to examine international environmental sustainability Indexes and make comparisons were between them. The Green Metric ranking system, which is known to be the most preferred among the sustainability evaluation indexes, and in which demanding international universities participate through an online survey, were examined. In this study, we consider the Turkish universities in the top 500 in the 2020 Green Metric ranking as material. When the Green Metric ranking results for 2020 are examined, it is seen that there has been an increase in the number of participating countries, and 45 universities from Turkey are included in this ranking. To determine the category with the highest impact on the success of these universities, universities with different rankings despite having the same overall score were compared.

Keywords: Green Campus; Green Metric; Sustainable Campus; Sustainability Index.

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1. Introduction

With the acceleration of industrialization in the 1970s, the increase in environmental problems on a global scale caused a common concern all over the world. The awareness that environmental problems, which increase their impact rapidly, will irreversibly affect the planet we live in, has led to the start of the environmental movement all over the world, especially in Europe and America. The United Nations Conference on the Human Environment (Stockholm Conference) was held in Sweden on 5-16 June 1972 on this subject, and the foundations of the concept of sustainability were laid in the Human Environment Declaration adopted at the conference (Bozlagan, 2007; Karci, 2019). Although the concept began to be discussed in political circles in the seventies to question the effects of human activities and natural resource consumption, for the first time in today's sense it was included in the United Nations' report called Brundtland in 1987 that sought solutions to issues such as eradication of poverty, equitable distribution of benefits from natural resources, population control and development of environmentally friendly technologies (Yalciner, 2018; Altun & Zencirkiran, 2021).

Among the many definitions of the concept, the most accepted one is made by the United Nations as “meeting the needs of the present without compromising the ability of future generations to meet their own needs." has been defined (United Nations, 1991). This awareness of sustainable development has emerged from the need for the balance that should exist between the environment, economy, and society, and its spread is thought to be possible only through knowledge transfer. Higher education institutions, which function effectively in the transfer of all kinds of knowledge, should act as a bridge between the transfer of scientific knowledge on sustainability and the implementation of sustainability practices (Guerra et al., 2018; Pereira Ribeiro et al., 2021).

Ensuring sustainability on university campuses has become a topic of increasing interest in the world, especially given the increasing power and returns of the pro-sustainability movement (Alshuwaikhat & Abubakar, 2008; Velazquez, Munguia, Platt, & Taddei, 2006; Ribeiro et al., 2020). Green campus initiatives, which are born due to the importance of the subject and focus on providing sustainable infrastructure on university campuses, reducing environmental impacts and economic costs, and increasing student awareness about the concept of sustainable development, are some of the strategies created and implemented by higher education institutions to promote sustainable development (Patel & Patel, 2012; Chalfoun, 2014; Hayder, 2017; Mafongosi, Awuzie, & Talukhaba, 2018; Ribeiro et al., 2020).

Higher education institutions who want to introduce environmental issues to society and integrate sustainability into their education and research programs with increasing concerns about environmental problems and the need to find solutions to climate change started the green campus studies. In this way, it is aimed to improve many important issues such as increasing environmental performance by increasing public awareness, reducing the cost of campus maintenance, efficient use of energy and water on campus, and good management of waste and green areas (Geng, Liu, Xue, & Fujita, 2013).

1.1. Related studies

In this context, many sustainable and green campus applications have been planned in state and foundation universities in our country, and many of them have been implemented. For example, the Hamlin Building at Bogazici University, the foundation of which was laid in 1868, was restored in 2011, the facade and roof of the building were completely renovated after the necessary repairs were made, and the building was given the title of Turkey's first green university building with Leed "GOLD" Certificate. Again, an LED lighting system was applied in a part of Bogazici University campus, 30% increase in energy efficiency has been achieved thanks to LED bulbs that last 10 times longer than conventional bulbs, where some of the energy is converted into heat (Anonymous 2020a).

In a study carried out for purposes such as continuing the water cycle, protecting natural drainage areas, contributing to the city's water cycle by improving forest areas, trees, and other open green areas, as well as reducing greenhouse gas emissions at Yildiz Technical University; a green area arrangement was made on an area of 240,310 m2 on the campus. To reduce the mains water used in the landscaping areas of the campus, the rainwater flowing from the roof gutters is collected in a 50-ton rain harvesting tank. The economic and smart systems with sensors, applied throughout the campus, irrigate open green areas by using the water in the rain harvesting tank (Anonymous 2020b). Again at Yildiz Technical University, in the 2018-2019 academic year, a total of 206 courses were given at all levels related to environment and sustainability. It has been reported that more than 100 scientific publications are made every year in the fields of environment and sustainability throughout the university, and a research income of over 3,000,000 TL is obtained in the field of sustainability within the scope of scientific projects (Anonymous 2020c).

A total of 6 kilometers of bicycle and pedestrian path project is under construction in Istanbul Technical University Ayazaga Campus. Bicycle rental will be carried out at the stations established within the campus. In addition, the construction of the ITU Bicycle House has been started to provide services such as discounted bicycle sales, bicycle repair, and maintenance, bicycle rental to campus residents. Again in ITU Ayazaga Campus, renovation and improvement works were carried out in the parking lots to reduce the traffic and carbon emissions and the damages to the trees and natural life in the forest, the student and guest parking lots were moved to central locations, and the shuttle vehicles were directed to an area away from the forest (Anonymous 2021a). As can be seen, different green campus implementations are carried out in many Turkish universities today.

1.2. Purpose of study

Today's universities want to make a name for themselves and set an example with their sustainable and environmentalist activities as well as their academic achievements. To measure the success of universities in this regard, many university sustainability ranking systems have been created and higher education has begun to be evaluated and ranked based on their sustainable activities (Altun & Zencirkiran, 2021). These ranking systems, created for evaluating and reporting sustainability performance, are valuable tools both to expand the success of high-achieving organizations and to provide entry points for organizations taking their first steps towards sustainability (UNEP, 2021). This study aims to examine international environmental sustainability Indexes and make comparisons were between them.

2. Material and Method

2.1. Material

In this study, the University League, Sustainability Tracking and Assessment Rating System, and GreenMetric international sustainability indexes, which evaluate the sustainability activities of universities, and Turkish universities that managed to be in the top 500 in the 2020 Green Metric ranking are considered as material.

2.2. Procedure

The study consists of four phases that support each other:

1. Literature review of sustainable campus and green campus concepts,

2. Examination and comparison of the University League, Sustainability Tracking and Assessment Rating System and GreenMetric international sustainability indexes,

3. Comparison of Turkish universities in the top 500 in the GreenMetric 2020 ranking based on points and categories,

4. Interpretation of the findings.

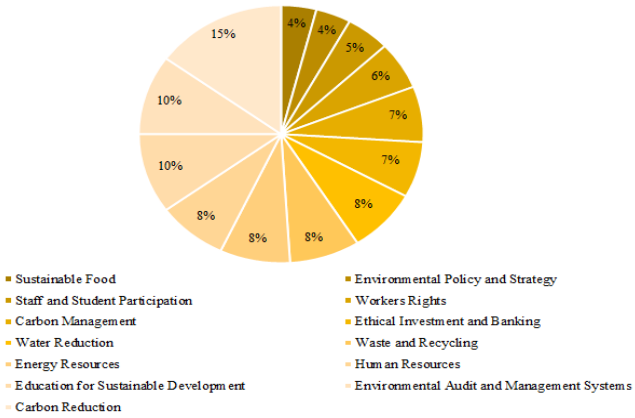
3. Results

3.1. Collected data

3.1.1. University League (UL)

The system, which evaluates British universities in terms of their environmental and sustainable actions (Anonymous 2021b), poses more than 100 questions (such as does the university have a public carbon management plan, does the university have a public sustainable food policy, does the university commit to education for sustainable development) to participating universities within the framework of 13 sustainability topics with different percentages of importance (Anonymous 2021c; Anonymous 2021d).

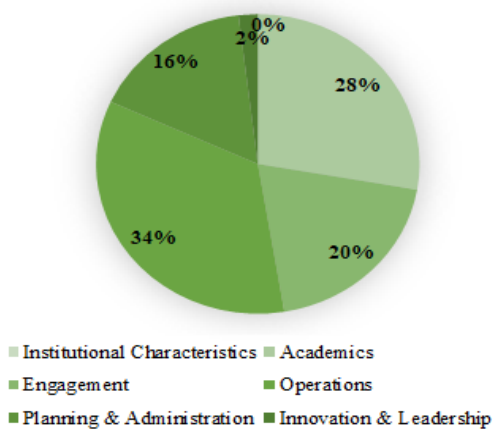
Figure 1
University League categories



3.1.2. Sustainability Tracking and Assessment Rating System (STARS)

STARS is a transparent, self-reporting system created to measure the sustainability performance of universities and colleges. The STARS reporting framework consists of several indicators organized in six categories (Figure 2): Education and Research, Business, Planning, Management and Participation, and Innovation. It aims to facilitate the sharing of information between institutions about the practices implemented to improve the sustainability approaches of universities, and also to make comparisons between institutions by using a common measurement set (Anonymous, 2019).

Figure 2
Sustainability Tracking and Assessment Rating System categories



3.1.3. Green Metric (GM)

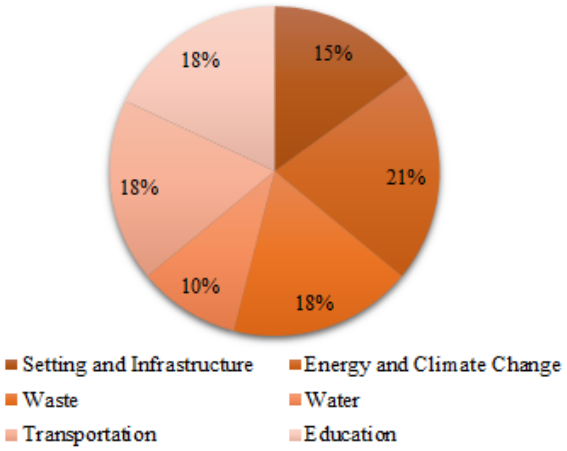
It is an initiative started by the University of Indonesia in 2010. Its purpose is to evaluate policies and activities on green campuses to promote a culture of sustainability in higher education institutions (Raggazi & Ghidini, 2017). Since it applies to universities in both developed and developing countries, it is the first of its kind in environmental management systems globally (Suwartha & Sari 2013; Ozdogan, 2018).

The system presents the results of a survey asking participating universities about their sustainability policies and activities (Anonymous, 2021e). Various indicators are provided by the participating universities for each category in the index, and a specific score is assigned to each indicator. The final score is the sum of the scores obtained for each indicator (Raggazi & Ghidini, 2017).

When the 6 categories in the system (Figure 3) and the sub-headings of these categories are examined, it is thought that it is aimed to present an evaluation tool to higher education institutions on the sustainable human, economic and environmental practices by conducting such a survey, evaluating and presenting the results to the public.

Figure 3

Green Metric categories



3.1.4. Turkish universities in the top 500 in the 2020 Green Metric ranking

Table 1

The total and category-based scores of Turkish universities in the top 500 in the 2020 Green Metric ranking and their averages

No	Rank	University	Total Score	Setting & Infrastructure	Energy & Climate Change	Waste	Water	Transportation	Education & Research
1	71	Istanbul Technical University	7800	1050	1225	1575	850	1475	1625
2	103	Middle East Technical University	7500	1125	1150	1200	825	1525	1675
3	142	Erciyes University	7175	1100	1250	1200	750	1375	1500
4	143	Ozyegin University	7175	825	1175	1350	650	1450	1725
5	148	Cyprus International University	7150	975	1400	1125	825	1475	1350
6	165	Ege University	7050	1075	1175	1200	700	1425	1475
7	186	Aksaray University	6900	1025	1150	1575	475	1275	1400
8	208	Hitit University	6700	900	1400	1800	400	1425	775

9	217	Izmir Institute of Technology	6675	1175	1175	1350	575	1475	925
10	244	Yildiz Technical University	6425	800	975	1050	800	1525	1275
11	269	Bartin University	6275	950	1150	1050	575	1350	1200
12	273	Yeditepe University	6250	725	1325	1125	675	1325	1075
13	295	Afyon Kocatepe University	6150	775	1350	1350	250	1450	975
14	303	Zonguldak Bulent Ecevit University	6150	775	1350	1350	250	1450	975
15	310	Sakarya University	6100	1150	1225	900	425	1325	1075
16	321	Cappadocia University	6050	775	950	1350	350	1425	1200
17	335	Cukurova University	5950	1325	975	525	350	1475	1300
18	340	Inonu University Malatya	5925	825	1250	900	450	1425	1075
19	380	Dokuz Eylul University	5650	1000	925	975	500	1200	1050
20	405	Baskent University	5575	975	1075	1050	400	1250	825
21	406	Mersin University	5575	1175	750	1125	300	1075	1150
22	408	Mugla Sitki Kocman University	5550	700	1400	825	250	1125	1250
23	412	Tokat Gaziosmanpasa University	5550	1200	775	975	475	1175	950
24	418	Istanbul Sabahattin Zaim University	5500	525	1375	1575	300	1000	725
25	442	Sabanci University	5375	1100	1050	1125	700	725	675
26	450	Suleyman Demirel University	5325	750	925	1575	250	1050	775
27	451	Nigde Omer Halisdemir University	5325	825	875	1275	350	1100	900
		Average Value	6252,78	948,15	1140,74	1202,78	507,41	1309,26	1144,44

Table 2

According to the standings of Turkish universities in itself, the top 500 Green Metric ranking for 2020; classifications created to be evaluated under high, medium, and low achievement groups.

	Total Score	Setting & Infrastructure	Energy & Climate Change	Waste	Water	Transportation	Education & Research
High	7800-6976	1325-1059	1400-1184	1800-1376	850-651	1525-1260	1725-1376
Medium	6975-6150	1058-792	1183-967	1375-950	650-450	1259-993	1375-1025
Low	6149-5325	791-525	966-770	949-525	449-250	992-725	1024-675

3.2. Comparison of University League, Sustainability Tracking and Assessment Rating System and Green Metric University Sustainability Assessment Systems

Researches show that with the increasing interest in sustainability activities in higher education, various international indexes have been created to measure university sustainability. Among these indexes, University League (UL), Sustainability Tracking and Assessment Rating System (STARS), and Green Metric (GM), which are known to be more reliable and applicable and more preferred by the participants due to their easy access to their criteria and their importance percentages, were examined and compared. As a result of the examinations, it is seen that the reasons and objectives of the

emergence of all three indices are generally the same, that they cover all dimensions of sustainability, including environmental, economic, and social, and that these dimensions are handled with a holistic approach. It is understood from the main topics covered by UL, STARS, and GM sustainability assessment systems that although there are differences between the categories and the percentages of the importance of their categories, all three of them meet at the same point with their assessment of the sustainability of people, buildings and green spaces within the campus.

When these three indices are examined in terms of the importance of their criteria, the highest percentage belongs to the "Energy and Climate" categories in GM, "Carbon Reduction" in UL, and "Academics" in STARS. The parameters with the lowest percentage of importance are “Water” in GM, “Policy and Strategy” with equal percentages in UL, “Sustainable Food” and “Innovation and Leadership” in STARS. When the indices are examined in terms of the diversity of the categories they have, it is seen that UL (13) has the highest number of categories, while STARS and GM have an equal number of categories (6 each).

3.2. Evaluation of Turkish Universities in the Top 500 in the GreeMetric Ranking of 2020

Examining Turkish universities, which are in the top 500 in the 2020 ranking of the GreenMetric index, which is the most preferred among university sustainability assessment tools, is important for a better understanding of the policies and practices that lead these universities to success. The universities in Table 1 were evaluated in terms of their total scores and the scores they had in each category. As a result of the evaluations, it is seen that:

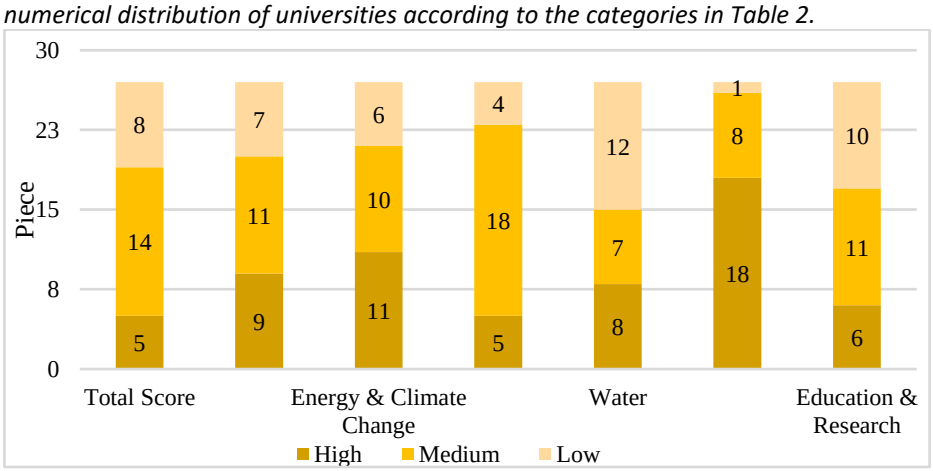
1. There are 27 Turkish universities in the Top 500 in the Green Metric Ranking of 2020 (Table 1). The total score average of these universities is 6252.78 and these universities are in the medium success category (Table 2) with a rate of 51.85%.

2. According to Table 2, universities with high achievement are in the minority at the rate of 18.52%.

3. When the scores of the universities based on categories are compared, the highest number of high achievements belongs to the transportation category (66.67%), and the highest number of low achievements belongs to the water category (29.63%) (Figure 4). Accordingly, the highest average "transportation" and the lowest average "water" belong to the categories. (Table 1).

Figure 4

The numerical distribution of universities according to the categories in Table 2.



4. Although the total scores of some universities in the list (Table 1) are equal, they have score differences based on category.

4. Discussion

When examined in terms of the contents of 3 different indexes (UI, STARS, and GM) created to evaluate sustainability in higher education; it is seen that all three of them fully address the social, environmental, and economic aspects of sustainability and include these issues in detail in their categories and sub-categories. The fact that many different indicators measuring sustainability have been developed in universities since the day the concept of sustainability was born indicates that indicators are open to development and change. It is thought that indicators should be constantly updated to keep up with the changing age and developing technology (Altun & Zencirkiran, 2021).

It is seen that a total of 912 universities participated in the UI Greenmetric world university rankings in 2020, and some of the participating universities did not ensure most of the categories but were still included in the list. This situation creates the impression that each participating university ensures the criteria of being a green campus. For this reason, the system should set a threshold value that we can have an idea about the minimum level of sustainability that a university should provide, and at least not include universities that do not exceed this value in the list. Because sustainability requires the environmental, social, and economic aspects to be considered as a whole, it is thought that the minimum level of success that universities should achieve should be determined based on categories and sub-categories.

As mentioned before, although the system is at the forefront with its global feature, it is believed that the survey is not of such a quality that participants from all over the world can respond under equal conditions. Considering the geographical and climatic conditions, development levels, cultures, and educational opportunities of the countries (Ragazzi & Ghidini, 2017), it is clear that universities cannot have equal conditions on the main subjects addressed in the GM, especially in the waste, energy and water categories. Limiting participation by determining a minimum sustainability standard will allow a fairer ranking.

5. Conclusion

It is believed that the system should describe the scores offered by the universities in a concrete way such as sufficient, insufficient, successful, unsuccessful or high, low to perceive the sustainability level and success of each university more clearly and qualitatively. In this way, it will be possible to evaluate, such as X university is successful in the waste and energy categories, but unsuccessful in the water category.

Again, as mentioned before, some universities in the list are ranked consecutively even though they have equal total scores. It should be explained is the factor that determines whether these universities are at the up or the down in the success ranking. Although there are some shortcomings (discussed by many scientists up to the present), sustainability assessment tools are useful as they serve as a guide in ensuring sustainability in universities. The existence of a standard guideline for a green campus reduces the question marks and assists universities with the policies and procedures they should follow.

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