



Innovations in Water Management for Sustainable Development of Higher Education Institutions: Experience from Ton Duc Thang University, Vietnam

Cuong Huu Nguyen^{1,*}, Suong Nguyet Thi Tran², Nghi Anh Duc Nguyen³

¹Education Research Group, Ton Duc Thang University, Ho Chi Minh City, Vietnam

²Faculty of Social Sciences and Humanities, Ton Duc Thang University, Ho Chi Minh City, Vietnam

³Department of Testing and Quality Assessment, Ton Duc Thang University, Ho Chi Minh City, Vietnam

*corresponding author: nguyenhuucuong@tdtu.edu.vn

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Abstract Ton Duc Thang University (TDTU), which was established in 1997, is a fully autonomous public university in Vietnam. After over 22 years of development, TDTU is now the number one university in Vietnam for all aspects. In 2019, TDTU was ranked the 1st in Vietnam and ranked 165th in the world on sustainable development by UI GreenMetric World University Rankings (UI GreenMetric). Among six categories of UI GreenMetric, including: setting and infrastructure, energy and climate change, waste, water, transport, and education, the water category of TDTU achieved 725 points out of 1000 maximum points (72.50%). This paper presents water management of TDTU, focusing on water conservation, water recycling, the use of water efficient appliances and piped water consumption. Specifically, the paper highlights innovations in water management that TDTU has implemented during the past few years. The paper concludes that sustainable water management makes great contribution to sustainable development of a higher education institution.

Keyword:

Water management, sustainable development, higher education, Ton Duc Thang University, UI GreenMetric

1. Introduction

Universities make great contribution to the economic and social development as well as environmental sustainability. Together with quality enhancement in teaching, learning and research, universities should play an active role in addressing environmental issues happening in the community in particular and the whole world in general [1]. Universities themselves need to create campaigns to raise awareness of the university leaders, managers, academics and students about the environmental challenges facing the world today. Established and developed by Universitas Indonesia in 2010, the UI GreenMetric World University Rankings (commonly known as UI GreenMetric) aims to measure sustainability efforts of university

campuses worldwide. Initiated with only 95 universities from 35 countries in 2010, the 2019 UI GreenMetric recorded the participation of 780 universities from 85 countries all over the world [2]. This shows that more and more universities worldwide found UI GreenMetric criteria and indicators useful to benchmark and enhance their sustainability.

Being a young Vietnamese public university with only 23 years of development, Ton Duc Thang University (TDTU) has made great efforts to become the leading higher education institution in Vietnam for all aspects. TDTU has continuously participated in UI GreenMetric World University Rankings since 2016 and has always ranked the first in Vietnam and in the top 200 or 300 of all universities worldwide. Among six categories, the Water of TDTU has gradually improved year by year gained better position. This paper discusses the innovations in water management of TDTU for its sustainable development.

2. An Overview of Ton Duc Thang University

Ton Duc Thang University (TDTU) is a public and fully autonomous university. Established in 1997, it is situated in the center of Ho Chi Minh City - the commercial hub of Vietnam. The University has five campuses, located in Ho Chi Minh City (two campuses), Nha Trang City, Lam Dong Province and Ca Mau Province. The main campus is located in an area of 265,000 m² in Tan Phong Ward, District 7, Ho Chi Minh City, Vietnam. TDTU is a young and dynamic provider in the higher education sector and is one of the largest universities in Vietnam [3]. The University is committed to Vietnam's sustainable development of human resources. It strives to be a leading research-oriented university regionally and internationally. The University has been fostering a unique culture that distinguishes itself from the other higher education institutions in Vietnam. Aiming to provide optimal opportunities for quality education, the University is devoted to the promotion of students' learning and research activities. All aspects of the University strive to constantly maintain an effective and efficient academic community for talents to be developed.

After 22 years of development, TDTU has become one of the fastest growing universities in the country. Currently, the University has 17 faculties with 1400 professors/lecturers (including more than 200 foreign professors/lecturers), 16 centers for technology applications, 5 institutes, 67 research groups, 2 scientific journals, 1 foundation for science and technology, and several laboratories. The University offers over 60 programs at the vocational, undergraduate and postgraduate levels. There are approximately 24,000 students pursuing their study at the university [4]. TDTU considers the connection with international partners through strategic cooperation as an important prerequisite for its sustainable development. Thus, more and more research projects have been initiated, established and conducted in the University with the leadership of internationally recognized experts. The partnerships with nearly 60 universities from different parts of the world also allow the University to exchange students, staff and training collaborations.

With all of the constant efforts from our academic staff, TDTU has achieved some international recognition recently. TDTU was ranked 207th among TOP 500 universities in Asia by QS Asia University Rankings 2020. In August 2019, TDTU was the first Vietnamese University ranked 901-1000 by the Academic Ranking of World Universities known as Shanghai Ranking. It was also ranked 301-400 in 2020 THE University Impact Rankings by the Times Higher Education. TDTU was also ranked the 1st in Vietnam and the 960th place in the world by University Ranking by Academic Performance in December 2019 [5].

As a young and vibrant institution with numerous learning pathways for students internationally and diversified opportunities for academic development, TDTU is committed

to being the best choice of students, academic staff, researchers and all stakeholders.

TDTU Mission: Education, research and creativity for sustainable development of humanity

TDTU Vision: For the development of humanity in a world of peace and happiness

TDTU Goal: To become an excellent research university in the world's TOP 200 universities

TDTU Educational philosophy: For the enlightenment of humanity

TDTU Code of conduct: Fairness, Effectiveness and Devotion

TDTU Messages: Nothing is more important than being effective; nothing is more valuable than treating others fairly; nothing is more honorable than devoting ourselves to the nation.

TDTU Slogan: Light from here shall illuminate the entire universe

3. Ton Duc Thang University with UI GreenMetric

Ton Duc Thang University (TDTU) began taking part in UI GreenMetric in 2016, and does it annually up to present. TDTU has always been ranked the 1st in Vietnam, and ranked in the top 200 worldwide except in the 245th position in 2017 (Fig. 1).



Figure 1. World ranking history of Ton Duc Thang University [6]

Most recently, in 2019, TDTU was ranked the 1st in Vietnam (Fig. 2) and 165th among 780 universities all over the world (Figure 3) by UI GreenMetric.

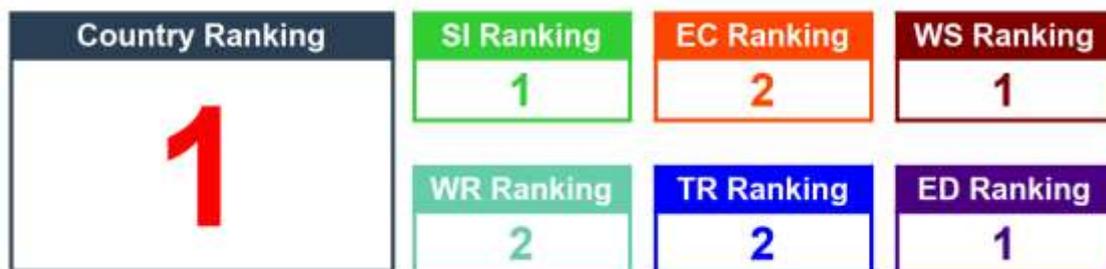


Figure 2. Ranking of Ton Duc Thang University in Vietnam [6]

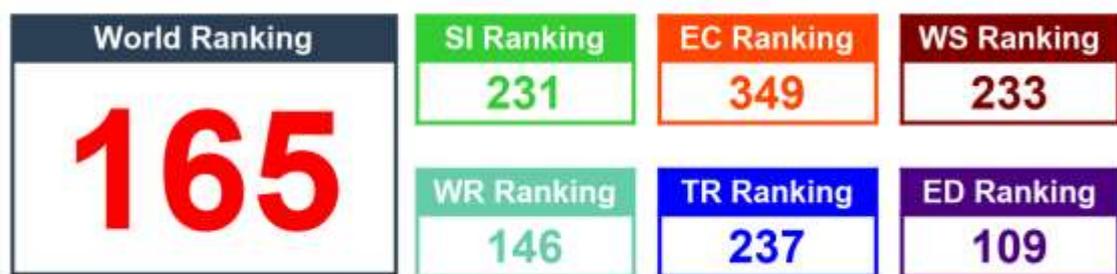


Figure 3. Results summary of Ton Duc Thang University [6]

It can be seen from Fig. 3 that in 2019, the categories of Education (ED) and Water (WR) of TDTU was ranked in the top 200 with ED ranked the 109th and WR ranked the 146th. Specifically, data of each category of TDTU was verified by UI GreenMetric highlights as presented in Table 1.

Table 1. Verified data of Ton Duc Thang University [6]

Category	Point	Percentage of Point to Total Score	Maximum Point	Percentage of Point to Maximum Point
Setting and Infrastructure (SI)	900	14%	1,500	60.00%
Energy and Climate Change (EC)	1,000	16%	2,100	47.62%
Waste (WS)	1,125	18%	1,800	62.50%
Water (WR)	725	11%	1,000	72.50%
Transportation (TR)	1,150	18%	1,800	63.89%
Education (ED)	1,425	23%	1,800	79.17%
Total Score	6,325	100%	10,000	63.25%

4. Water Ranking of Ton Duc Thang University

Water ranking of TDTU by UI GreenMetric has improved gradually since TDTU participated in this world university ranking in 2016. As shown in Table 2, when TDTU first took part in UI GreenMetric, it was ranked the 156th for all categories. However, ranking in the Water was only in the 273rd with percentage of only 35%, which was much lower than the average. From 2017, water ranking of TDTU improved steadily. In 2018 and 2019, the percentage of Water category was above 50% and its ranking was better than world ranking for the institution.

Table 2. Summary of TDTU water ranking in 2016-2019

Year	World Ranking	Water Ranking	Percentage of Point to Maximum Point
2016	156	273	35.00%
2017	245	-	50.00%
2018	182	131	65.00%
2019	165	146	72.50%

5. Innovations in Water Management at Ton Duc Thang University

With five campuses located in different parts of the country, TDTU has taken great care of water management. Using UI GreenMetric criteria and indicators as benchmarking points, TDTU gave good performances in Water. Specifically, TDTU have implemented innovations in water management that have been consistent with four indicators of the Water category suggested by UI GreenMetric.

5.1. Water Conservation Program Implementation

TDTU has implemented several water conservations programs. For example, the University dug a large lake in Bao Loc campus to store rainwater for tree and grass watering (Figure 4). Fortunately, there are two canals running through the Tan Phong campus. These canals help store water and reduce the heat. We believe that over 50% of water was conserved in TDTU campuses [7].



Figure 4. The lake in Bao Loc campus

5.2. Water Recycling Program Implementation

The University has implemented several water recycling programs. Particularly, TDTU installed a waste water treatment system with the capacity of 1200m³ per day in Tan Phong campus. Moreover, the University installed water tanks to store rainwater and treat it to make it possible for drinking (Figure 5). These programs were still implemented at early state [7].



Figure 5. Water tanks of rainwater for drinking

5.3. Water Efficient Appliance Usage

Water efficient appliances have been installed in all buildings of the University, particularly restrooms and hand washing places. TDTU only used modern appliances that save water, for example dual-flush toilet and water saving taps (Figure 6). In TDTU, more than 50% of water efficient appliances were installed [7].



Figure 6. Water saving taps are being used

5.4. Treated water consumed

As discussed in section 5.2, TDTU installed a waste water treatment system. Therefore, treated water was consumed in many activities. Specifically, the University have been using treated waste water for gardening, cleaning and washing floors and facilities in outdoor activities (Figure 7). At TDTU, we are proud to say that more than 75% of treated water was consumed [7].



Figure 7. Treated waste water is being used for gardening

6. Concluding Remarks

TDTU aims to become an excellent research university in the top 200 universities worldwide. When participating in UI GreenMetric, TDTU leaders realized that together with building academic reputation, the University need to focus on sustainability [8]. Administrators, teachers, staff and students of the University have been aware that sustainability is an important element that helps promote teaching, learning and research

activities in the University. Water, which is one of the crucial categories of the sustainability, has been TDTU's focus. The University has implemented innovations in water management, which was recognized by UI GreenMetric. To consume, recycle and treat water more effectively, TDTU need to be more innovative in water management in its campuses.

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