Published by Management Department FEB Universitas Kuningan

Indonesian Journal of Strategic Management

Journal homepage – https://ijsm.uniku.ac.id/pub/index

Analysis and Recommendations for Campus Waste Management Based on UI GreenMetric Indicators at a Private University in Bandung

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ARTICLE INFO

***Articles History**:*
Received: July 23, 2026
Revised: Aug 27, 2026
Accepted: Aug 31, 2026
Available online: Sep 9, 2026

***Keywords**:*
Green Campus, UI Green Metric, Waste Management, Campus Sustainability

ABSTRACT

This research aims to analyze figure out management conditions at a private university in Bandung based on waste category indicators in the UI GreenMetric World University Rankings and provide recommendations for improvement to support the Green Campus concept. The research method used was direct observation of the campus environment and interviews with cleaning managers, followed by assessment using the UI GreenMetric instrument. The data obtained was analyzed devinitive by comparing the existing circumstances with the established indicators. The results revealed that the campus has established some waste management indicators, namely the 3R which is Reduce, Reuse, Recycle program and pograms aimed at cutting down paper and plastic use. Meanwhile, the management of organic waste, inorganic waste, hazardous and toxic waste (B3), and liquid waste has not been optimally implemented, resulting in low scores in the waste category. Therefore, several improvement efforts are needed, such as processing organic waste into compost, collaborating with waste banks for inorganic waste management, managing B3 waste through third parties, and processing liquid waste using environmentally friendly methods. These recommendations are expected to improve waste management on campus and support the development of a greener and more sustainable campus environment.

JEL Classification : Q53, Q56, I23, R11

Introduction

The issue of sustainable development has become a major global concern since the publication of the Brundtland Report by the World Commission on Environment and Development in 1987 (Shao et al., 2026). The report defines sustainable development as a development process that meets the needs of the present generation without compromising the ability of future generations to meet their own needs. This concept emphasizes the importance of achieving a balance among social, economic, and environmental dimensions while ensuring the responsible use of natural resources over the long term. In the context of increasing population growth and resource consumption, sustainability has become increasingly important across various sectors, including higher education as part of the broader social system (Fauziah & Handoyo, 2025).

Higher education institutions generate various types of waste through academic, administrative, and operational activities. Therefore, effective waste management is an important component of implementing sustainability within universities. However, waste management practices in higher education institutions may

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still face challenges related to waste segregation, collection, transportation, processing, and disposal. These challenges indicate the need for a systematic evaluation of waste management practices to determine their alignment with sustainability principles.

In addition, although sustainability has increasingly been incorporated into university assessment and ranking systems, there is still a need to examine how waste management practices at individual universities correspond to the indicators used in international sustainability rankings. One relevant framework is the UI GreenMetric World University Rankings (UIGM), which assesses university sustainability performance through several indicators, including waste management. This provides an opportunity to evaluate existing waste management practices and identify areas that require improvement based on internationally recognized sustainability indicators.

Therefore, this research aims to assess the current condition of waste management at a private university in Bandung and identify areas that require improvement based on the waste management indicators of the UI GreenMetric World University Rankings. The findings are expected to provide recommendations for improving waste management practices and supporting the university's efforts toward more sustainable campus management.

Literature Review

As an institution focused on education, research, and community service, universities are strategically positioned to spread awareness and combine sustainability principles into their educational processes and operational activities. This strategic role is emphasized by various international instruments that call for the partisipation of higher education in continous development, including through the development of relevant curricula, thematic research, and practical implementation on campus. Thus, campuses not only function as places of learning but also as contributors of social and environmental transformation, integrating sustainability values into all aspects of academic life (Pascawati et al., 2015).

The amount of waste in the campus environment can be measured using solid waste minimization, which is done by measuring waste generation and analyzing waste composition, as well as conducting surveys of the academic community to determine their behavior and level of participation in waste management. This approach intent to identify the amount, type, and source of waste generated on campus so that more effective waste reduction strategies can be formulated (Safitri et al., 2020). At the National University of Malaysia, waste measurements were also conducted on campus using the accumulation measurement method and waste composition analysis through waste sampling at several waste source points on campus. The samples obtained were then sorted by type to determine the proportion of each waste category (Tiew et al., 2019).

Following growing international awareness of the importance of sustainability, the concept of green campuses has become one of the practical method adopted by many universities in various countries. In 2010, the University of Indonesia initiated the UI Green Metric World University Rankings (UIGM) as a worldwide standard for evaluating sustainability in academic institutions (Husin et al., 2025). Since 2018, 719 universities from 81 countries have took part in the UIGM (Suwartha & Ali Berawi, 2019). The UIGM framework assesses six categories: Environment and Infrastructure, Water and Education and Research, Waste, Energy, Transportation, and Climate Change. These six categories have a total of 51 assessment indicators (Greenmetric, 2019). This initiative focuses on integrating environmentally friendly practices into campus management, including energy and waste management, emission reduction, and the development of an environmentally conscious culture among the academic community. This approach not only covers internal environmental policies but also encourages behavioral change and holistic thinking about sustainability at the university community level (Mujaahid et al., 2017). In studies conducted to address the issue of double scoring that can be found in the UIGM, the Data Envelopment Analysis (DEA) method can be added (Puertas & Marti, 2019).

Human activities contribute the most to waste in the environment. Based on its form, waste is categorized into: 1) Solid Waste, which is waste that has a solid form or shape, 2) Liquid Waste, which is waste that has a liquid form or shape and is soluble in water, 3) Gaseous Waste, which is waste that is gaseous and always moves with the air (Bambang et al., 2022). Solid waste management can be carried out in several ways: 1) Waste sorting, such as paper, cans, bottles or plastic, 2) Containment to facilitate further processing (Bambang et al., 2022). The escalation in the number of students and academic activities in the university environment grows in line with the increase in in the amountof waste generated, so a planned and sustainable waste management system is needed to minimize environmental impact. (Ghandi et al., 2023).

One of the main key factors in establishing a sustainable environment are recycling and waste management. It is inevitable that the actions of staff and students on campus cause a lot of waste, so waste management programs must be an integral part of campus management, such as recycling programs, toxic waste recycling, organic waste management, inorganic waste management, waste disposal, and policies aimed at reducing the use of paper and plastic on campus (Budihardjo et al., 2021).

Methodology

This study was conducted at a private university in Bandung. Data collection was carried out through direct surveillance in the field and the completion of assessment forms based on UI GreenMetric. This research relied on primary and secondary data, in which primary data was obtained through observations related to waste management at the research site, particularly in the dimensios of waste treatment and recycling. The data was collected through surveillance and scoring according to the UI GreenMetric indicators, then analyzed using a simple calculation of the average score for each assessment category. Secondary data was obtained from relevant literature studies, and if the assessment results showed no score for a particular indicator, a recommendation was made for the campus to apply or implement the Green Campus concept in accordance with the UI GreenMetric framework. Table 1. The UI GreenMetric assessment shows the assessment instruments in the waste category (Greenmetric, 2019).

Table 1. UI GreenMetric Ranking

Waste (WS)	Categories and indicators	Points	Score
WS 1	3R Program (Reduce, Reuse, Recycle) for university waste	300	
	None.		0
	Program in prepartion		0,25x300
	Program in preparation 1% - 50%		0,50x300
	Program in preparation > 50% - 75%		0,75x300
	Program in preparation > 75%		1,00x300
WS 2	Campus programs to reduce paper and plastic use on campus	300	
	None. Select this option if there are no programs on your campus.		0
	1 Program		0,25x300
	2 Programs		0,50x300
	3 Programs		0,75x300
	More than 3 programs		1,00x300
WS 3	Organic waste treatment	300	
	Disposed of in open areas		0
	Partially (1-25% treated)		0,25x300
	Partially (>25%-50% treated)		0,50x300
	Partially (>50%-75% treated)		0,75x300
	Partially (>75% treated)		1,00x300
WS 4	Inorganis waste treatment	300	
	Disposed of in open areas		0
	Partially (1-25% treated)		0,25x300
	Partially (>25%-50% treated)		0,50x300
	Partially (>50%-75% treated)		0,75x300
	Partially (>75% treated)		1,00x300
WS 5	Treatment of toxic waste	300	

	Not enforced		0
	Partially (1-25% handled)		0,25x300
	Partially (>25%-50% handled)		0,50x300
	Partially (>50%-75% handled)		0,75x300
	Partially (>75% handled)		1,00x300
WS 6	Waste water treatment	300	
	Discharged into rivers/waterways		0
	Treated conventionally		0,25x300
	Treated technically for reuse		0,50x300
	Treated technically down-cycling		0,75x300
	Treated technically for up-cycling		1,00x300

Source: UI Green Metric Guidelines

Result and Discussion

In this study, researchers carried out surveillance and interviews with cleaning managers at the campus where the study was conducted. The findings showed that on this campus, Regarding the 3R which Reduce, Reuse, Recycle program indicator for campus waste, the university implemented the 3R program by providing gallons of mineral water to reduce the consumption of bottled water. This is in accordance with Table 1. The UI GreenMetric assessment shows the assessment instruments in the waste category.

Table 2. Assessment of the 3R Reduce, Reuse, Recycle program indicators for university waste

Waste (WS)	Categories and indicators	Points	Score
WS 1	3R Program (Reduce, Reuse, Recycle) for university waste	300	
	None.		0
	Program in prepartion		0,25x300
	Program in preparation 1% - 50%		0,50x300
	Program in preparation > 50% - 75%		0,75x300
	Program in preparation > 75%		1,00x300

Source : Author's Calculation Result

The program that has been implemented in the Management Study Program is the collection of final projects without the creation of physical reports, so that all documents are collected in soft file format.

Table 3. Assessment of program indicators to reduce the use of paper and plastic on campus

Waste (WS)	Categories and indicators	Points	Score
WS 2	Campus programs to reduce paper and plastic use on campus	300	
	None. Select this option if there are no programs on your campus.		0
	1 Program		0,25x300
	2 Programs		0,50x300
	3 Programs		0,75x300
	More than 3 programs		1,00x300

Source : Author's Calculation Result

According to the assessment result using UI GreenMetric, the campus currently only implements two indicators, namely the 3R program and the initiative to minimize paper and plastic usage on campus. Meanwhile, other waste management indicators have not been implemented. Therefore, program recommendations are needed to be proposed to the campus to complete the waste management indicators that have not been achieved in the context of implementing the Green Campus concept.

By implementing UIGM since 2019, Telkom University has risen to 102nd place worldwide among campuses that implement UIGM (Sari et al., 2023). By implementing UIGM, Padjadjaran University now has a strong regulatory foundation to support the implementation of sustainability concepts, both from national policies and internal university regulations. At the national level, there are regulations such as the Law on Environmental Protection and Management (UUPPLH), Presidential Regulation No. 61 of 2011, and Regulation of the Minister of Environment and Forestry No. P.75 of 2019. Meanwhile, at the internal university level, there are various policies such as Rector's Regulations, standard operating procedures (SOPs) akin to energy and waste management, also policies restricting the utilization of single-use plastics. These regulations form the normative basis for the implementation of sustainable practices on the univesity (Sumpena et al., 2025). The benefits of implementing UIGM at the University of Indonesia campus nor encourage the development of individuals, and academic institutions towards sustainability, while also expand its contribution through numerous online events, such as live discussions, courses, workshops, webinars, and podcasts across the year. These initiatives have managed to reach a wider audience, resulting in impactful behavioral changes as participants become involved in the campaign and actively commit to the UIGM rankings (Sari et al., 2024).

The third proposed indicator is an organic waste management program. Campuses can follow the example of Diponegoro University, namely Setia Wacana Christian University, which produces compost (Biologi et al., 2024). Next, for the fourth indicator, namely the inorganic waste management program, campuses can collaborate in managing inorganic waste with waste banks located around the campus, as done by Bakrie University with Bank Sampah Dipo to receive waste that has been collected from its source, where the waste is weighed, sorted, and processed before being distributed to the recycling industry (Lingkungan et al., 2024). . Next, for the fifth indicator, namely toxic waste processing, campuses can collaborate with third parties in the collection of hazardous and toxic waste, as done by Sebelas Maret University, where the process is handed over directly to third parties (Wirodimurti et al., 2022). Finally, for the sixth indicator Liquid Waste Treatment, campuses can manage liquid waste using water hyacinth, as done by Jambi University, which has implemented this in managing liquid waste in the cafeteria. The results show that the use of water hyacinth can reduce the Chemical Oxygen Demand (COD) level by 96.46% (Situmeang et al., 2024).

The limited implementation of waste management indicators on the campus can be attributed to the absence of an integrated waste management system that covers organic, inorganic, hazardous and toxic (B3), and liquid waste. Although the campus has implemented several waste reduction initiatives, such as providing refillable drinking water gallons and reducing paper use through digital submission of final projects, these initiatives have not yet been supported by systematic waste segregation, treatment, recycling, and monitoring programs. This condition may be influenced by limited institutional programs, infrastructure, and collaboration with external waste management partners. The implications are not only reflected in the relatively low UI GreenMetric waste score of 225, but also in the potential loss of recyclable materials, increased dependence on conventional waste disposal, and greater environmental risks associated with untreated B3 and liquid waste. Therefore, improving waste management requires a shift from individual waste reduction initiatives toward an integrated system involving infrastructure, institutional policies, external partnerships, and participation from the academic community.

These findings are consistent with previous studies indicating that effective university waste management requires systematic waste reduction, segregation, recycling, and community participation. Safitri et al. (2020), for example, emphasized waste generation measurement and waste composition analysis as a basis for developing more effective waste minimization strategies, while Ghandi et al. (2023) demonstrated the potential of integrating the 3R concept with waste banks at Tanjungpura University. However, the present findings indicate that the campus under study has progressed mainly at the waste reduction level and has not yet developed the downstream treatment mechanisms reported in these studies. This difference suggests that implementing isolated 3R initiatives is insufficient to achieve comprehensive sustainable waste management. Similarly, the experience of Bakrie University, which collaborates with Bank Sampah Dipo to collect, sort, and channel inorganic waste to the recycling industry, demonstrates a more integrated approach to inorganic waste management (Lingkungan et al., 2024). For organic waste, previous research has also shown the feasibility of composting as part of the green campus concept (Biologi et al., 2024). Furthermore, Wirodimurti et al. (2022) reported the use of third-party services for hazardous waste management at Sebelas Maret University, while Situmeang et al. (2024) demonstrated that technical treatment can significantly reduce pollutants in cafeteria wastewater. Compared with these studies, the campus in this study still lacks specific treatment mechanisms for these waste streams. Thus, the main gap is not merely the absence of waste-related programs, but the lack of continuity between waste reduction, segregation, treatment, and final management.

Strengthening these components simultaneously would improve the campus's UIGM performance while reducing environmental risks and supporting the development of a more sustainable campus.

Conclusion

Following on the research findings, it can be stated that waste management on campus is still not fully optimal when viewed from the UI GreenMetric indicators. At present, the campus has only adopted a few measures, such as the use of drinking water gallons to minimize plastic waste and the reduction of paper use through a digital system. Based on the UI GreenMetric instrument, it was found that this campus only scored 225 in the Waste category. This is because the management of organic waste, inorganic waste, hazardous waste, and liquid waste has not been implemented comprehensively. Therefore, UNIKOM needs to improve waste management by creating a more comprehensive program, collaborating with relevant parties, and raising awareness among all levels of the academic community to support the realization of an environmentally friendly and sustainable campus.

In summary, the finding of this study show the application of the Green Campus concept in waste management at UNIKOM still needs further development to be in line with the UIGM indicators. The implementation of the proposed recommendations is expected to not only improve assessment scores but also foster an environmentally conscious culture on campus. With institutional commitment and the active participation of all levels of academic community, sustainable waste management can be achieved gradually and continuously.

References

Bambang, S. et al. (2022) Pengelolaan Limbah Padat, Limbah Industry Dan B3. Edited by M. Sari and R. Maida Sahara. GET PRESS INDONESIA.

Biologi, I. et al. (2024) 'Mengembangkan Kampus Hijau : Kondisi Paduk Pengelolaan Limbah ', 7(2), pp. 30–39.

Budihardjo, M.A. et al. (2021) 'Sustainable Solid Waste Management Strategies for Higher Education Institutions : Diponegoro University , Indonesia Case Study'.

Fauziah, R.R. and Handoyo, S.S. (2025) 'Analisis Pengelolaan Sampah di Kampus Universitas Negeri Jakarta sebagai Bagian dari Green Campus', 1(3), pp. 788–800.

Ghandi, A., Susilowati, D. and Sutrisno, H. (2023) 'Jurnal Presipitasi Solid Waste Management System in Tanjungpura University : 3Rs concept integrated with the Waste Bank', Jurnal Presipitasi, 20(1), pp. 104–113.

Greenmetric, U.I. (2019) 'UI GreenMetric World University Rankings 2019'.

Husin, A.E., Kussumardianadewi, B.D. and Guruh, H. (2025) 'Implementation of The Green Campus Concept Based on The UI GreenMetric Guidelines Approach', 7(4), pp. 1–22.

Lingkungan, J.I., Nursetyowati, P. and Zahra, N. (2024) 'Strategi Pengelolaan Sampah Terintegrasi Menuju Kampus yang Berkelanjutan di Universitas Bakrie', 22(6), pp. 1424–1434. Available at: https://doi.org/10.14710/jil.22.6.1424-1434.

Mujaahid, F. et al. (2017) 'Potentials of Organic Waste Conversion in a Green Campus Concept', 1(4), pp. 183–188.

Pascawati, N.A. et al. (2015) 'Analisis dan Rencana Pengelolaan Sampah di Perguruan Tinggi Sesuai Konsep Green Campus (Studi Kasus : Universitas Respati Yogyakarta)'.

Puertas, R. and Marti, L. (2019) 'Sustainability in Universities : DEA-GreenMetric', Sustainability (Switzerland), 11(19).

Safitri, A.I. et al. (2020) 'Sustainable Campus Through Solid Waste Minimization Strategies Case study : Universitas Agung Podomoro in Indonesia', International Journal of Built Environment and Scientific Research, 04(02), pp. 101–114.

Sari, R.F. et al. (2023) 'The Impact of UI GreenMetric Involvement on Universities ' Performance in Shaping a Sustainable Campus', Journal of Sustainability Perspective, pp. 399–414. Available at: https://doi.org/10.14710/jsp.2023.20847.

Sari, R.F. et al. (2024) 'Incorporating Digital Media Platforms to Enhance Sustainability Insights in the UI GreenMetric World University Rankings Network', Journal of Sustainability Perspective, 4(Special Issue), pp. 456–484.

Shao, C., Chen, S. and Zhan, X. (2026) 'Sustainable Development Agenda : Historical Evolution , Goal Progression , and Future Prospects', pp. 1–27.

Situmeang, E. et al. (2024) ‘Pengolahan Limbah Cair Kantin FST Universitas Jambi dengan Memanfaatkan Zeolit dan Eceng Gondok (Eichhornia Crassipes)’, 3(4), pp. 420–431. Available at: https://doi.org/10.55123/insologi.v3i4.3962.
Sumpena, A., Wahyudin, U. and Rahmat, A. (2025) ‘Analisis implementasi Green Campus di Universitas Padjadjaran melalui Integrasi Teori Hukum Pembangunan dan Komunikasi Lingkungan’, Bina Hukum Lingkungan, 10(1), pp. 169–195.
Suwartha, N. and Ali Berawi, M. (2019) ‘The Role Of Ui Greenmetric As A Global Sustainable Ranking For Higher Education Institutions’, 10(5), pp. 862–865.
Tiew, K. et al. (2019) ‘Composition of Solid Waste in a University Campus and its Potential for Composting’, International Journal on Advance Science Engineering Information Technology, 1(6), pp. 675–678.
Wirodimurti, I. et al. (2022) ‘An Analysis of Hazardous and Toxic Waste Management (Case Study : Faculty of Mathematics and Natural Sciences Laboratory , Sebelas Maret University)’, 3(1), pp. 26–33.