



PLANNING MALAYSIA:

Journal of the Malaysian Institute of Planners

VOLUME 23 ISSUE 4 (2025), Page 615 – 628

INVESTMENT IN SUSTAINABILITY UNIVERSITY GREEN CAMPUS PROJECTS: THE CASE OF UNIVERSITI MALAYA, MALAYSIA

Rui Wang¹, Lee Ting Ni², Zulkiflee Abdul-Samad³, Muhammad Hadi Mustafa⁴, Mazura Mahdzir⁵, Nafisah Ya'cob@Ya'acob⁶, Sharifah Mazlina Syed Khuzzan⁷

*^{1,2,3,4,5} Department of Quantity Surveying, Faculty of Built Environment,
UNIVERSITI MALAYA*

*⁶ Department of Quantity Surveying, Faculty of Built Environment
TUNKU ABDUL RAHMAN UNIVERSITY OF
MANAGEMENT AND TECHNOLOGY*

*⁷ Department of Quantity Surveying,
Kulliyyah of Architecture and Environmental Design,
INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA*

Abstract

Sustainability has become a central priority in higher education, with universities worldwide investing in initiatives to reduce environmental impact and promote long-term responsibility. Despite this trend, there remains limited comparative research on Universiti Malaya's (UM) sustainability practices concerning established green campuses. This study addresses this gap by examining UM's sustainability investments and identifying areas for improvement. A quantitative approach was adopted, involving a questionnaire survey of 361 UM employees. Data were analysed using the Relative Importance Index (RII) to rank the significance of sustainability initiatives. The findings reveal waste management and external stakeholder collaborations are the most prominent investment areas. At the same time, other initiatives are perceived at medium to high levels of importance, indicating a solid foundation for UM's sustainability efforts. The study recommends strengthening institutional strategies by benchmarking UM's practices against international green campus models. The results contribute to advancing UM's environmental responsibility and aligning its efforts with broader sustainability goals.

Keywords: Sustainable investment, Universiti Malaya, university green campuses

³ Corresponding author. Email: zulkiflee1969@um.edu.my

INTRODUCTION

Sustainability has evolved into a paramount pillar of global discourse, advocating for the seamless integration of economic progress, societal equity, and environmental stewardship (Al-Sakkaf et al., 2021; Fallah Shayan et al., 2022; Mohd Muhiddin et al., 2023). One of the cornerstones in the global movement toward sustainability is the proliferation of award-winning green campuses worldwide. These campuses represent the pinnacle of environmental consciousness and exemplary sustainable practices. Renowned institutions such as Arizona State University, University of California, Irvine, and the University of Nottingham have been recognised for their exceptional efforts in creating sustainable campuses. These campuses serve as global benchmarks, showcasing innovative approaches to sustainability by integrating renewable energy sources, implementing green technologies, and adopting eco-friendly practices across their operations (Alhazemi, 2024; Mohd-Rahim et al., 2018).

This surge in interest in sustainability aligns with Universiti Malaya's (UM) proactive steps toward fostering sustainability within its academic community. UM has been increasingly focused on integrating sustainable practices into its educational programmes, campus operations, and research initiatives (Universiti Malaya, 2021, 2024). However, while UM's dedication to sustainability is commendable, a noticeable disparity remains concerning routine maintenance considerations. While UM has placed considerable emphasis on external landscape initiatives, such as green spaces and energy-efficient buildings (Yuvarani & Nurulaini, 2019), the focus on internal factors vital for long-term sustainability may have inadvertently taken a back seat. In contrast to globally recognised green campuses, where sustainability is a part of daily operations and standard maintenance practices, UM appears to lack the same level of comprehensive integration of sustainability principles into its routine operational practices. UM also lacks innovative and varied investing techniques.

Within the broader spectrum of sustainability initiatives, investment financial management holds a pivotal position, intricately woven into the fabric of responsible practices (Boffo & Patalano, 2020). Its incorporation into sustainability initiatives signifies a shift towards comprehensive and conscientious approaches. Going beyond monetary concerns, this facet of investment within sustainability endeavours involves strategic resource allocation, ensuring economic feasibility and synchronisation with environmental stewardship and societal welfare (Mensah, 2019). Globally recognised higher education institutions have established a precedent by adeptly integrating financial management into their sustainability endeavours, highlighting the significance of structured investment initiatives that bolster sustainability goals. This amalgamation of investment within sustainability signifies the necessity for an integrated approach, intertwining financial considerations with environmental

impact, societal well-being, and governance paradigms, aiming for astute resource allocation to secure economic returns (Onuselogu & Shahzad, 2023; Salleh et al., 2022).

Disappointingly, despite notable strides in sustainability initiatives, the effective integration of investment within UM's sustainability efforts remains challenging. A substantial research gap regarding aligning UM's investment with its sustainability goals needs specific attention and investigation. Therefore, this research compares the sustainability investment of green university campuses and UM. The study involves an extensive review of the university's sustainable investment initiatives, an evaluation of UM's current initiatives, and the creation of cohesive initiatives aligning UM's investment decisions with sustainability objectives. The ultimate goal is to strengthen UM's commitment to sustainability and to pioneer the harmonisation of financial prudence with environmental stewardship, fostering a thriving and enduringly sustainable campus (Qi et al., 2023).

INVESTMENT INITIATIVES FOR SUSTAINABILITY AT REPRESENTATIVE UNIVERSITY

Investment initiatives for green campuses involve financial strategies that support sustainability projects within educational institutions. These include funding environmentally beneficial initiatives, waste management, renewable energy, and technologies to reduce environmental impact. The goal is to make financial decisions that promote sustainability while protecting the environment and generating profits (Bhattacharyya, 2020; Khoshbakht et al., 2019).

A global review of green campuses shows universities implementing various investment initiatives to achieve sustainability. These initiatives cover renewable energy investments, partnerships and collaborations, socially responsible investments, energy efficiency improvements, green infrastructure development, waste management initiatives, sustainable transportation, and continuous monitoring and improvement. Table 1 summarises the investment initiatives for sustainability at a representative university green campus. Based on the results in Table 1, this study provides a reference for optimising the investment in green campuses at UM.

Table 1: Investment initiatives for sustainability implemented by university green campuses

Initiative	Representative Universities	Key Outcomes	Citations
Renewable Energy	Nottingham, Toronto, California, Imperial, Emory, Bryant, Lancaster	Up to 40% carbon reduction; solar, wind, geothermal adoption; PV-leaf tech (+10% efficiency); electricity savings >USD 80,000; 50% reduction in heating emissions.	University of Nottingham (2024); University of Toronto (2024); University of California (2024); Bryony (2023); Gana (2020); Kimmell et al. (2020); Ian (2022)
Energy Efficiency	California, British Columbia, MIT, Washington	LEED-certified buildings (31 Gold+); USD 50M utility grants; high-efficiency retrofits; CO ₂ reduction >2,300 tonnes; multi-million-dollar savings.	University of California (2023); University of British Columbia (2019); MIT (2024); University of Washington (2024)
Green Infrastructure	Arizona State, Stanford, MIT, Pennsylvania, Nottingham	Rain gardens, permeable pavements, stormwater systems; reduced flood risk; water conservation; BREEAM Excellent/LEED ratings.	Arizona State University (2020); Bea et al. (2019); MIT (2023); Penn (2024); University of Nottingham (2024)
Waste Management	Arizona State, Auckland, Massey, Sheffield	72% recycling rate; >2,000 tonnes diverted; composting/reuse; landfill waste reduced by 10%; annual savings >£125,000.	Arizona State University (2013); Moezzi & Janda (2014); University of Auckland (2024); Kelly et al. (2006); Zhang et al. (2011)
Sustainable Transportation	UC Davis, Stanford	EV and low-carbon transport research; hybrid/electric buses; >2.7M rides; cycling/ride-sharing culture.	University of California (2021); Stanford University (2023)

Based on this literature, renewable energy adoption has become a significant focus, with institutions such as Nottingham, Toronto, and California achieving up to 40% reductions in carbon emissions through solar, wind, and geothermal projects (University of Nottingham, 2024; University of Toronto,

2024; University of California, 2024). Energy efficiency improvements are another critical area, as seen at MIT, UBC, and Washington, where large-scale retrofitting, LEED-certified buildings, and utility savings have substantially reduced energy consumption (University of British Columbia, 2019; MIT, 2024; University of Washington, 2024). In terms of green infrastructure, campuses such as Arizona State, Stanford, and Nottingham have invested in rain gardens, permeable pavements, and stormwater systems to reduce flood risks and enhance resource conservation (Arizona State University, 2020; Bea et al., 2019; University of Nottingham, 2024). Waste management initiatives, including composting, recycling, and circular economy practices, have diverted thousands of tonnes of waste annually, as demonstrated by Auckland, Sheffield, and ASU (Arizona State University, 2013; University of Auckland, 2024; Zhang et al., 2011). Sustainable transportation is another priority, with UC Davis and Stanford promoting electric vehicles, hybrid buses, and cycling, reducing reliance on fossil-fuel transport (University of California, 2021; Stanford University, 2023). Beyond infrastructure, universities such as Edinburgh, UCL, and Vermont have embraced socially responsible investments, divesting fossil fuels and integrating ESG principles into financial management (UCL, 2018; University of Edinburgh, 2020; University of Vermont, 2024). Partnerships and collaborations, such as those between UBC and the City of Vancouver, demonstrate how long-term cooperation enhances sustainable outcomes (Plaut et al., 2013; Pauer et al., 2020). Finally, as practised at Nottingham and Lancaster Universities, continuous monitoring and reporting systems ensure that sustainability remains a dynamic and accountable process (University of Nottingham, 2021; Ian, 2022). In conclusion, these examples highlight universities' diverse but complementary approaches to advance campus sustainability. They also provide a strong benchmark for evaluating and improving UM's sustainability initiatives.

RESEARCH METHODOLOGY

This study adopted a quantitative research approach using a questionnaire survey as the primary research method to examine Universiti Malaya's (UM) sustainability investment initiatives. The data collection instrument was structured into four sections: demographics, familiarity with sustainability initiatives, current UM practices, and areas for improvement, using a 5-point Likert scale with an open-ended option for additional input. The target population comprised UM employees (academic, operations, and executive staff), chosen because of their longer tenure and familiarity with institutional procedures compared to students. The sample size was determined using Krejcie and Morgan's (1970) formula, with the UM Fact Sheet (2025) reporting 5,629 employees, yielding a required sample of 360. A simple random sampling technique was applied to ensure that every employee had an equal chance of

selection. The survey was administered via Google Forms and distributed through official email, Telegram, and WhatsApp, with reminders to enhance participation. In total, 361 valid responses ($n = 361$) were received. Data were analysed using SPSS for descriptive statistics (to profile demographic distribution and respondent characteristics, with total numbers and percentages stated in tables and charts) and the Relative Importance Index (RII) to prioritise sustainability initiatives. The Relative Importance Index (RII) was applied, calculated using the following formula:

$$RII = \frac{\sum wA}{N \times A} \quad RII = \frac{\sum w}{N \times A}$$

Where w = weight given by each respondent (1–5), A = highest possible weight (5), and N = total number of respondents. RII values were then ranked into five levels of importance (Mustafa et al., 2021).

The RII values were categorised into five importance levels, allowing systematic ranking of initiatives. The findings provide evidence-based insights that directly inform UM's sustainability strategy, highlighting key areas such as waste management, stakeholder collaboration, and continuous monitoring that can advance UM's environmental responsibility and long-term sustainability goals.

RESULT AND DISCUSSION

The 361 respondents to the questionnaire survey at UM represent diverse age groups, job categories, roles, educational backgrounds, and work experiences, as shown in Table 2. Most respondents are 36 to 45 (32.5%), and local academic staff (36.67%). A significant portion holds advanced degrees, with 36.67% possessing a PhD. Most participants have over ten years of work experience, providing a strong foundation of institutional knowledge. Administrative staff and senior lecturers were most represented, focusing on the university's investment strategy and sustainability efforts. The respondents' varied backgrounds offer comprehensive insights into UM's sustainability practices, highlighting strengths and areas for improvement in its initiatives. This diversity ensures a thorough understanding of the university's sustainability policies and offers multiple perspectives for future developments.

Table 2: Pie Chart Distribution

Roles	Nos	Percentage %
Administration	17	14.17%
Assistant Architect	1	0.83%
Assistant Project Officer	2	1.67%
Assistant Quantity Survey	1	0.83%
Assistant Registrar	3	2.50%
Assistant Science Officer	3	2.50%
Associate Professor	7	5.83%
Development & Property	8	6.67%
Engineer	5	4.17%
IT Officer	4	3.33%
Lecturer	12	10.00%
Librarian	4	3.33%
Post-Doctoral Research	7	5.83%
Producer	1	0.83%
Professional & Management	13	10.83%
Professor	8	6.67%
Research Officer	6	5.00%
Senior Lecturer	16	13.33%
Skill Assistant	2	1.67%
Total	120	100%

Familiarity with Investment Initiatives for Sustainability implemented by University Green Campuses

According to Table 3, data analysis revealed that UM employees' familiarity with sustainability initiatives falls between medium and high levels, with sustainable transportation being the most recognised initiative (RII: 0.645), reflecting UM's proactive efforts in promoting sustainable transportation (Universiti Malaya, 2024). Other initiatives, such as waste management, partnerships, and continuous improvement, also show significant recognition (RII: 0.642–0.633). However, familiarity with renewable energy investments is lower among UM employees, possibly due to the lower visibility of such projects on campus and the technical complexity of renewable energy (Gajdzik et al., 2023). The analysis categorised the initiatives into high-medium and medium relevance levels, highlighting well-established areas such as sustainable transportation and waste management while suggesting that renewable energy may require more promotion and investment. These findings provide valuable insights into the recognition and significance of sustainable investment decisions in university green campuses.

Table 3: Ranking of Familiarity of Investment Initiatives for Sustainability implemented by University Green Campuses

ID	Familiarity with Investment Initiatives for Sustainability implemented by University Green Campuses	RII	Overall Ranking
F5	Sustainable Transportation	0.645	1
F7	Partnerships and Collaborations	0.642	2
F4	Waste Management Initiatives	0.633	3
F8	Continuous Improvement and Monitoring	0.632	4
F3	Green Infrastructure Development	0.612	5
F2	Energy Efficiency Improvements	0.593	6
F6	Socially Responsible Investments	0.593	7
F1	Renewable Energy Investments	0.587	8

Source: compiled from data analysis results

Current Investment in Sustainability Implemented by Universiti Malaya

According to Table 4, findings show that all initiatives are of high-medium importance, with waste management ranking highest, emphasising recycling and circular economy concepts. This reflects UM's commitment to sustainability and environmental leadership, with programs like the Zero Waste Campaign and water conservation efforts (Universiti Malaya, 2022, 2024). Collaborations with external stakeholders, such as NGOs, further enhance UM's impact on Sustainable Development Goals (SDGs). However, renewable energy initiatives rank lower, suggesting areas for future development, likely due to high initial costs and limited visibility (Lorente et al., 2023). In summary, UM's sustainability investments align with long-term goals and potential improvements in clean energy efforts.

Table 4: Ranking of Current Investment in Sustainability Implemented by UM

ID	Current Investment in Sustainability Implemented by Universiti Malaya	RII	Overall Ranking
C3	Implement waste reduction strategies	0.732	1
C5	Collaborate with external stakeholders	0.725	2
C4	Emphasise economic viability	0.707	3
C2	Eco-friendly behaviours	0.705	4
C6	Monitoring and continuous improvement	0.697	5
C1	Integrate clean energy initiatives	0.693	6

Areas of Improvement in UM's Investment for Sustainability

This section analyses the areas in UM sustainability investment that require improvement, as shown in Table 5. The RII and mean values highlight key regions, with continuous improvement and monitoring ranked first. This suggests that UM needs better systems for assessing and improving sustainability activities, such as road maintenance and cycling facilities (Kamarudin et al., 2023). Sustainable transportation follows closely, indicating a need to improve infrastructure to reduce environmental impact due to campus traffic congestion. Green infrastructure, waste management, and energy efficiency improvements also rank high, focusing on reducing environmental impact and promoting sustainability (Hajam et al., 2023; Selamat et al., 2017). Partnerships and socially responsible investments (SRI) are also prioritised but face challenges in implementation (Martini, 2021). Lastly, renewable energy investments are ranked the lowest, likely due to high initial costs and technical complexities (Gajdzik et al., 2023). These findings suggest areas for future development in UM's sustainability strategy.

Table 5: Ranking of Areas of Improvement in UM's Investment for Sustainability

ID	Areas of Improvement in UM's Investment for Sustainability	RII	Overall Ranking
A8	A Continuous Improvement and Monitoring	0.788	1
A5	A Sustainable Transportation	0.770	2
A3	A Green Infrastructure Development	0.768	3
A4	A Waste Management Initiative	0.767	4
A2	Energy Efficiency Improvements	0.765	5
A7	Partnerships and Collaborations	0.763	6
A6	A Socially Responsible Investment	0.762	7
A1	A Renewable Energy Investment	0.747	8

Source: compiled from data analysis results

These findings demonstrate how targeted improvements in waste management, stakeholder engagement, and continuous monitoring can enhance UM's institutional responsibility toward environmental stewardship.

CONCLUSION

This study examined Universiti Malaya's (UM) investment initiatives for sustainability, focusing on employees' perceptions of current practices, familiarity with green campus strategies, and areas for improvement. Using a questionnaire survey of 361 respondents and applying the Relative Importance Index (RII), the findings highlight waste management, stakeholder

collaborations, and continuous monitoring as the most significant priorities. These results suggest that while UM has a solid foundation in sustainability, greater attention is needed for renewable energy and socially responsible investments, which remain relatively underdeveloped. However, the research encountered several limitations, including imbalanced responses, time constraints, and restricted access to some literature, which may have influenced the comprehensiveness of the analysis.

Future studies are encouraged to target more balanced respondent groups, adopt qualitative or mixed-method approaches, extend data collection periods, and conduct comparative analyses across green campuses. Despite these limitations, the study contributes meaningfully to advancing UM's environmental responsibility by identifying clear and actionable areas for improvement. Strengthening waste reduction strategies, expanding collaborations, and embedding continuous monitoring systems can enhance UM's capacity to manage sustainability more effectively. Moreover, aligning these improvements with international best practices and the United Nations Sustainable Development Goals (SDGs) will help position UM as a leading sustainable university in the region, reinforcing its long-term commitment to environmental stewardship and institutional sustainability.

ACKNOWLEDGEMENT

The authors would like to thank Universiti Malaya (UM) for granting permission and access to institutional data used in this research.

REFERENCES

- Alhazemi, A. A. (2024). Transformative approaches to sustainable education: Technology, leadership and SDGs in higher education institutions. *International Journal of Learning, Teaching and Educational Research*, 23(5), 41–67.
- Al-Sakkaf, A., Bagchi, A., Zayed, T., & Mahmoud, S. (2021). Sustainability assessment model for heritage buildings. In *a Smart and sustainable built environment*. Emerald Group Publishing Ltd. <https://doi.org/10.1108/SASBE-03-2021-0049>
- Arizona State University. (2013). *Zero Waste | Arizona State University*. <https://cfo.asu.edu/zerowaste>
- Arizona State University. (2020, October 14). *Arizona State University Orange Mall Green Infrastructure Project | Landscape Performance Series*. <https://www.landscapeperformance.org/case-study-briefs/ASU-orange-mall>
- Bea, G., Kim, Q., Perrine, H., & Jordy, W. (2019). *Using Nature to Tackle Water Infrastructure Challenges: Frontiers of Green Infrastructure Research at Stanford*. <https://waterinthewest.stanford.edu/news-events/news-insights/using-nature-tackle-water-infrastructure-challenges-frontiers-green>
- Bhattacharyya, S. (2020). Green Campus Initiative: Response from a Self-financed Educational Campus—A Case Study. In S. K. Ghosh (Ed.), *Sustainable Waste*

- Management: Policies and Case Studies* (pp. 321–331). Springer Singapore.
https://doi.org/10.1007/978-981-13-7071-7_29
- Boffo, R., & Patalano, R. (2020). ESG investing: Practices, progress and challenges. *Éditions OCDE, Paris*.
- Bryony, R. (2023). *A new bio-inspired solar leaf design with increased harvesting efficiency* | Imperial News | Imperial College London.
<https://www.imperial.ac.uk/news/246833/bio-inspired-solar-leaf-design-with-increased/>
- Fallah Shayan, N., Mohabbati-Kalejahi, N., Alavi, S., & Zahed, M. A. (2022). Sustainable development goals (SDGs) as a framework for corporate social responsibility (CSR). *Sustainability*, 14(3), 1222.
- Gajdzik, B., Wolniak, R., Nagaj, R., Grebski, W. W., & Romanyszyn, T. (2023). Barriers to renewable energy source (RES) installations as determinants of energy consumption in EU countries. *Energies*, 16(21), 7364.
- Gana, A. (2020). *Transformative solar power agreement will help Emory reduce greenhouse gas emissions* | Emory University | Atlanta GA.
https://news.emory.edu/stories/2020/05/upress_solar_installation/index.html
- Hajam, Y. A., Kumar, R., & Kumar, A. (2023). Environmental waste management strategies and vermi transformation for sustainable development. *Environmental Challenges*, 13, 100747.
- Ian, S. (2022). *Landscape Management & Maintenance Plan*.
<https://www.lancaster.ac.uk/media/lancaster-university/content-assets/documents/facilities/grounds/2.PublishedManagement&MaintenancePlan-UpdatedFeb2022.pdf>
- Kamarudin, H., Kadir, S. A., Alias, R., & Othman, R. D. (2023). Transportation barriers confronted by mobility-challenged travellers in Klang Valley. *Planning Malaysia*, 21.
<https://planningmalaysia.org/index.php/pmj/article/view/1274>
- Kelly, T. C., Mason, I. G., Leiss, M. W., & Ganesh, S. (2006). University community responses to on-campus resource recycling. *Resources, Conservation and Recycling*, 47(1), 42–55.
- Khoshbakht, M., Gou, Z., & Dupre, K. (2019). Campus green buildings: Policy implications for the implementing, monitoring and evaluation of campus green building initiatives. *IOP Conference Series: Earth and Environmental Science*, 294(1), 012004. <https://iopscience.iop.org/article/10.1088/1755-1315/294/1/012004/meta>
- Kimmell, T., Kimmell, P., Sorensen, M., Ruggiero, C., & Coit, B. (2020). Investing in a green future: Universities and renewable energy. *Bryant University Undergraduate Journal*, 1(1), 5.
- Krosnick, J. A. (2018). Questionnaire Design. In D. L. Vannette & J. A. Krosnick (Eds.), *The Palgrave Handbook of Survey Research* (pp. 439–455). Springer International Publishing. https://doi.org/10.1007/978-3-319-54395-6_53
- Lorente, D. B., Joof, F., Samour, A., & Türsoy, T. (2023). Renewable energy, economic complexity and biodiversity risk: New insights from China. *Environmental and Sustainability Indicators*, 18, 100244.

- Martini, A. (2021). Socially responsible investing: From the ethical origins to the sustainable development framework of the European Union. *Environment, Development and Sustainability*, 23(11), 16874–16890. <https://doi.org/10.1007/s10668-021-01375-3>
- Massachusetts Institute of Technology. (2023). *Green Building Infrastructure Renewal, Building 54*. <https://capitalprojects.mit.edu/projects/building-54-infrastructure-renewal>
- Massachusetts Institute of Technology. (2024). *Energy Efficiency | MIT Sustainability*. <https://sustainability.mit.edu/energy-efficiency>
- Mensah, J. (2019). Sustainable development: Meaning, history, principles, pillars, and implications for human action: Literature review. *Cogent Social Sciences*, 5(1), 1653531. <https://doi.org/10.1080/23311886.2019.1653531>
- Moezzi, M., & Janda, K. B. (2014). From “if only” to “social potential” in schemes to reduce building energy use. *Energy Research & Social Science*, 1, 30–40.
- Mohd Muhiddin, A. A., Mohd Isa, H., Md Sakip, S. R., Mohd Nor, O., & Sedhu, D. S. (2023). Green Campus Implementation in The Malaysian Public Universities: Challenges and Solutions. *Planning Malaysia*, 21(25). <https://doi.org/10.21837/pm.v21i25.1239>
- Mohd-Rahim, F.A., Abd-Rahim, M.S., Zainon, N., Chuing, L.S., & Abd-Samad, Z. (2018). Project life cycle risk of public-private partnership (PPP) projects for construction sustainability. *Journal of Design and Built Environment*, (Special Issue), 39–53. <https://doi.org/10.22452/JDBE.SP2018NO1.4>
- Mustafa, M. F., Isa, M. R. M., Rauf, U. F. A., Ismail, M. N., Shukran, M. A. M., Khairuddin, M. A., Wahab, N., & Safar, N. Z. M. (2021). Student perception study on smart campus: A case study on higher education institution. *Malaysian Journal of Computer Science*, 1–20.
- Onuselogu, N., & Shahzad, A. (2023). *Impact of sustainable investment on the financial performance.: Evidence from Pakistani banking sector*. <https://www.diva-portal.org/smash/record.jsf?pid=diva2:1779242>
- Pauer, E., Wohner, B., & Tacker, M. (2020). The influence of database selection on environmental impact results. Life cycle assessment of packaging using gabi, ecoinvent 3.6, and the environmental footprint database. *Sustainability*, 12(23), 9948.
- Penn. (2024). *Stormwater Management | Penn Sustainability*. <https://sustainability.upenn.edu/stormwater-management>
- Plaut, J., Cress, C. M., Ikeda, E. K., & McGinley, P. (2013). *Partnering in tough times: Service-learning for economic vitality*. https://pdxscholar.library.pdx.edu/elp_fac/7/
- Qi, F., Abu-Rumman, A., Al Shraah, A., Muda, I., Rosario, H-S., Tran Hi, H.Y., Abdul-Samad, Z., & Michel, M. (2023). Moving a step closer towards environmental sustainability in Asian countries: focusing on real income, urbanization, transport infrastructure, and research and development. *Economic Research Ekonomika Istrazivanja*, 36(1), 3576–3595. <https://doi.org/10.1080/1331677X.2022.2111317>
- Salleh, H., Ying, C. K., Hanid, M., Abdul Samad, Z., Mohamed Sabli, N. A., & Syed Khuzzan, S. M. (2022). Development of guidance for the adoption of circular

- economy in construction and demolition waste management. *Planning Malaysia*, 20(24). <https://doi.org/10.21837/pm.v20i24.1216>
- Selamat, I. A. M., Sharif, S. M., & Gobilik, J. (2017). Green Infrastructure Development As Education For Sustainable Development Model In Universiti Malaysia Sabah. *Journal of BIMP-EAGA Regional Development*, 3(1), 43–55.
- Stanford University. (2023). *Transportation | Sustainable Stanford*. <https://sustainable.stanford.edu/systems/transportation>
- Tholibon, D. A., Nujid, M. M., Mokhtar, H., Rahim, J. A., Aziz, N. F. A., & Tarmizi, A. A. A. (2021). Relative Importance Index (RII) in Ranking the Factors of Employer Satisfaction towards Industrial Training Students. *Online Submission*, 2(4), 493–503.
- UCL. (2018, June 12). *Ethical Investment*. Sustainable UCL. <https://www.ucl.ac.uk/sustainable/about-us/ethical-investment>
- Universiti Malaya. (2021). *Sustainability Policies, Blueprint, Plans and Guidelines*. <https://sustainability.um.edu.my/sustainability-policies-blueprint-plans-and-guidelines>
- Universiti Malaya. (2022). *UM Waste Management Report*. <https://sustainability.um.edu.my/doc/Sustainability%20UM/Sustainability%20Reporting/UM%20Waste%20Management%20Report%202022.pdf>
- Universiti Malaya. (2024). *UM Living Labs (UMLL) @ UMSDC*. <https://sustainability.um.edu.my/um-living-labs-umll>
- Universiti Malaya. (2025). *UM Fact Sheet*. <https://www.um.edu.my/um-fact-sheet>
- University of Auckland. (2024). *Minimising waste*. <https://www.auckland.ac.nz/en/about-us/about-the-university/the-university/sustainability-and-environment/sustainable-campus-and-operations/sustainable-practices/waste.html>
- University of British Columbia. (2019). *LEED at UBC*. <https://sustain.ubc.ca/campus/green-buildings/leed-ubc>
- University of California. (2021). *ITS About—ITS*. <https://its.ucdavis.edu/about/>
- University of California. (2023). *Energy Efficiency | UCOP*. <https://www.ucop.edu/energy-services/programs-initiatives/energy-efficiency.html>
- University of California. (2024). *Going Solar | Sustainability & Carbon Solutions*. <https://sustainability.berkeley.edu/carbon-solutions/going-solar>
- University of Edinburgh. (2020, September 11). *University invests £5 million in green projects*. The University of Edinburgh. <https://sustainability.ed.ac.uk/news/2020/responsible-investment-hsbc-pri>
- University of Nottingham. (2021). *Monitoring and reporting—The University of Nottingham*. <https://www.nottingham.ac.uk/sustainability/strategy/monitoringreporting.aspx>
- University of Nottingham. (2024). *Carbon and energy—The University of Nottingham*. <https://www.nottingham.ac.uk/sustainability/carbonmanagement/carbonmanagement.aspx>
- University of Toronto. (2024). *Climate Positive Campus*. <https://climatepositive.utoronto.ca/>

Rui Wang, Lee Ting Ni, Zulkiflee Abdul-Samad, Muhammad Hadi Mustafa, Mazura Mahdzir, Nafisah Ya'cob@Ya'acob, Sharifah Mazlina Syed Khuzzan
Investment In Sustainability University Green Campus Projects: The Case of Universiti Malaya, Malaysia

- University of Vermont. (2024). *Responsible Investing*.
<https://www.uvm.edu/sustainabilityoffice/responsible-investing#gsc.tab=0>
- University of Washington. (2024). *Energy*. <https://sustainability.uw.edu/campus/energy>
- Yuvarani, S., & Nurulaini, A. S. (2019). *Are We Doing Our Part for Sustainability?*
<https://um.edu.my/sustainability>
- Zhang, N., Williams, I. D., Kemp, S., & Smith, N. F. (2011). Greening academia: Developing sustainable waste management at Higher Education Institutions. *Waste Management*, 31(7), 1606–1616.

Received: 2nd May 2025. Accepted: 10th September 2025