

## **Enhancing the Level of Sustainable Campus: The Projects and Case Study of Universiti Malaya, Kuala Lumpur**

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### **Abstract**

Fostering a sustainable campus environment is crucial for mitigating environmental impacts and promoting ecological responsibility. Numerous higher education institutions worldwide have demonstrated their dedication to putting the Sustainable Campus concept into action. However, the research that comprehensively examines sustainability in a holistic and linked way was insufficient. This study aimed to enhance the level of a sustainable campus at University of Malaya. The following objectives were addressed to identify the characteristics of a sustainable campus, to investigate the challenges faced by universities and to propose strategies to enhance the level of sustainable campus within this institution. A qualitative approach was used in this study. Six people were selected for interview sessions from two domain groups. The collected data was then analyzed using thematic analysis. The findings showed that a sustainable campus environment requires a comprehensive approach encompassing green campus operations, management practices, organizational strategies, and integration into teaching and research. Several suggestions were proposed to enhance the level of sustainability at University of Malaya.

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## 1.0 INTRODUCTION

Sustainability can be defined as the ability of our societies to meet the requirements of the present without sacrificing the ability of future generations to meet their own needs (Mazza, 2021). Meanwhile, Ermakov and Ermakov (2024) mentioned the concept of sustainable development tries to cover the economy and society in harmony with the ecological systems and the biosphere of the Earth as a whole. It remains crucial to achieve the global stability, highlighting the urgency of addressing environmental challenges and social inequalities (Aghajani et al., 2024).

Within Higher Education Institutions (HEIs) context, it has primary functions are to create and distribute knowledge. According to Hussain et al., (2019) and Veidemane (2022), sustainable development in universities encompasses the efforts made by people to create socially, economically, and environmentally viable communities that are fair and beneficial for both current and future generations. The university community must be made aware of the importance of campus sustainability at an early stage.

A sustainable campus refers to the integration of environmentally conscious activities and educational initiatives that attempt to foster sustainable and eco-friendly behaviors within an educational institution (Berita Harian, 2021). Environmentally friendly concepts are created as a means for commercial organizations to uphold their environmental responsibility. In the meanwhile, educational institutions create ecologically friendly ideas such as sustainable campuses, sustainable education, and green campuses (Zhao et al., 2019).

Numerous higher education institutions worldwide have demonstrated their dedication to putting the Sustainable Campus concept into action (Sugiarto et al., 2020). However, there is still a lack of research that comprehensively examines sustainability in a holistic and linked way. Some important questions remained unresolved, even though research demonstrated that some course subjects are more important than the number of courses attended (Hakim and Tri Endangsih, 2021; Fachrudin et al., 2019). Currently, many institutions address sustainability problems in a fragmented manner, where sustainability teaching is limited to specialized courses and separated from research and campus operations (Metz et al., 2022; Sadan, 2024).

The Sustainable Campus idea must be adopted since several studies such as Homer and Khor (2021) have shown that the stakeholders of universities implementing the Sustainable Campus are much happier and have a better perceived quality of life than those from universities that do not follow the concept.

### 1.1 Characteristics of Sustainability Campus

There are four key factors that are crucial for environmental sustainability have been identified which are the adoption of eco-friendly physical operations on the campus, administrative practices, organizational and leadership strategies, and the incorporation of sustainability into teaching, research, and service. (Asadikia et al., 2024; Anthony, 2021; Menon and Suresh, 2020). Campus-wide initiatives that cover all aspects are essential for promoting sustainable practices. (Amaral et al., 2020).

### 1.2 Green Campus Physical Operation

The successful implementation of environmentally friendly practices in the day-to-day operations of higher education institutions is recognized as a significant achievement (Menon and Suresh, 2020). According to Mahdee et al., (2022), adopting the green campus approach can result in a significant change in cultural mindset, positioning institutions as frontrunners in global sustainability efforts. This approach highlights the significance of incorporating sustainable practices into all facets of campus.

### 1.3 Administrative Practices

According to Mpuangnan and Roboji (2024), strong leadership is crucial for effective campus administration. Strong leadership is crucial for guiding, promoting cooperation, and effectively executing policies and initiatives in higher education institutions. In addition, effective leadership in the field of environmental sustainability necessitates individuals who possess charisma and can motivate and direct others toward adopting sustainable practices (Anthony, 2021). These influential leaders act as catalysts for change, motivating their campus communities to adopt and promote environmental stewardship (Miller et al., 2021).

#### **1.4 Organizational and Leadership Strategies**

According to Mansor et al., (2023), various forms of engagement such as through students, faculty, and staff remains important in driving sustainability initiatives across the entire campus. Both top-down influence, which involves administrators and faculty acting as environmental change agents and role models, and bottom-up influence, which involves student advocacy raising awareness, are considered necessary for achieving environmental sustainability (Leal Filho et al., 2020).

#### **1.5 Incorporation of Sustainability into Teaching and Research**

Incorporating environmental sustainability into an institution's fundamental activities of teaching, research, and service is a crucial aspect of campus sustainability, as highlighted by Anthony (2021). This comprehensive approach expands the dedication to sustainability beyond the physical administration of campuses, encouraging higher education institutions to incorporate environmental awareness into their core activities. Colleges and universities have a crucial role in educating students, faculty, and staff about the importance of environmental responsibility and promoting a comprehensive understanding of sustainability principles (Menon and Suresh, 2020; Avelar and Farina, 2022).

#### **1.6 Challenges faced by universities**

There is a lack of awareness about the concept of sustainability in the campus society, which includes faculty members, staff members, and students (Nawi and Choy, 2020). This lack of awareness has been a barrier to the readiness and development of green university initiatives. There is a lack of awareness regarding sustainability, which has led to the sustainability programs that are implemented by higher education institutions receiving less attention. For instance, campus sustainability can be accomplished through active participation of a wide variety of stakeholders in establishing campus landscapes (Gomez and Derr, 2021). Next, according to Ribeiro et al., (2020), a lack of communication makes it more likely that individuals are not aware of and knowledgeable about campus sustainability activities. A lack of knowledge of the topic of campus sustainability and the advantages it offers might lead to resistance to change. As a result of this resistance to change, as well as a lack of awareness of the environmental and economic benefits of campus sustainability programs, there is a possibility that interest in environmentally friendly measures could decrease at educational institutions of higher learning (Rosernberg, 2023). Sgarra et al., (2022) added that, it has been shown that providing students with information on environmental issues enhances their likelihood of using sustainable mobility, which in turn leads to a reduction in the use of private transport. Their understanding about the concept of sustainability can have a beneficial impact on the modes of transportation that they choose to use.

Recognising these challenges, this study needs to be carried out to address environmental concerns that impede the attainment of sustainability on campus. The main aim of this study is to enhance the level of a sustainable campus at Universiti Malaya, Kuala Lumpur. To achieve this aim, the research objectives are to identify the characteristics of sustainability on the campus, investigate the challenges faced by University of Malaya, and propose strategies to enhance sustainability within this institution.

## **2.0 METHODS**

Using a simple random sampling technique (Thomas, 2022), the data will be gathered qualitatively, through a semi-structured interview. This approach remains a suitable option for this research as it involves complex questions or issues (Osborne & Grant-Smith, 2021). Data collection is the systematic process of acquiring and measuring information on variables of interest to answer specific research questions. Next, the information gathered from semi-structured interviews will be thoroughly analyzed via thematic analysis (Christou, 2022). The participants involved were experts affiliated with University of Malaya, including lecturers and a unit associated with University Malaya Sustainability and Development Centre (UMSDC) as stated in the following Table 1.

**Table 1.** Details of The Interviewee.

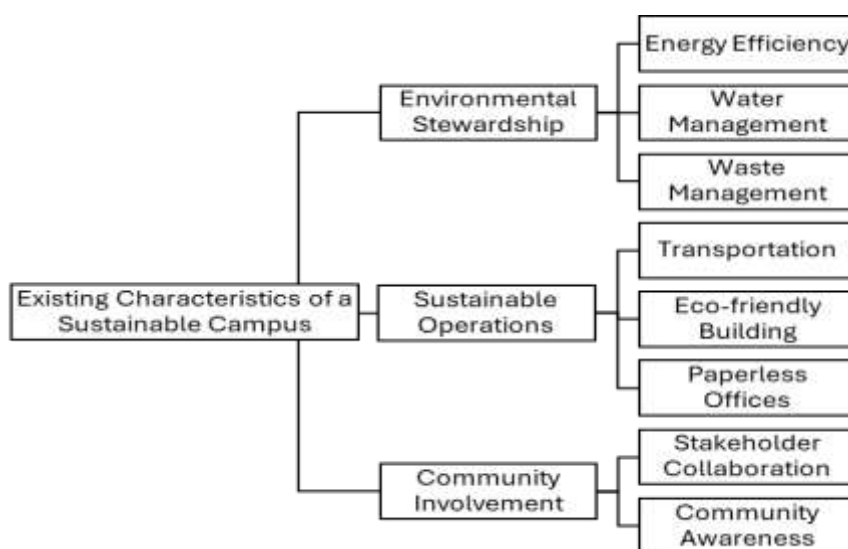
Participant	P1	P2	P3	P4	P5	P6
Age	39	34	49	31	40	28
Genders	Male	Male	Female	Male	Male	Female
Race	Malay	Malay	Chinese	Malay	Malay	Malay
Working Experience	10 years	10 years	More than 10 years	10 years	More than 10 years	10 years
Working Scope	Education	Education	Education	Sustainability Researcher	Education	Sustainability Researcher
Position	Research Officer	Research Officer	Lecturer	Research Officer	Lecturer	Research Officer

Note: (P) = Participant

### 3.0 RESULTS AND DISCUSSION

#### 3.1 Characteristics of Sustainability on the Campus of University of Malaya

Figure 1 shows the existing characteristics of a sustainable campus within University of Malaya. There are eight (8) codes and three (3) themes generated from the analysis. The themes are environmental stewardship, sustainable operations, and community involvement.



**Figure 1.** Existing Characteristics of a Sustainable Campus.

#### 3.2 Environmental Stewardship

The results revealed a prominent emphasis on Environmental Stewardship, with specific reference to diverse programs that focused on energy efficiency (J. Yasuoka et al., 2022). Multiple participants (P1, P2, P4, and P6) highlighted the installation of LED lights around the institution as a prominent example. Tanavade et al., (2023) stated this effort not only aids in conserving energy but also corresponds with the university's dedication to sustainable practices and decreasing its carbon footprint.

In addition, the attendees also considered the implementation of solar energy to improve energy efficiency (Zhou et al., 2021). The participant stated that the solar panels are deployed in various locations, such as streetlights and buildings. Incorporating solar panels into the university's infrastructure exemplifies a proactive strategy for utilizing renewable energy sources. This institution is actively utilizing solar electricity for lighting and buildings to decrease its dependence on non-renewable energy sources and mitigate its environmental footprint. These activities demonstrate the institution's commitment to environmental

stewardship and its role in advocating for sustainable practices within the academic community and beyond (Fitria Avicenna et al., 2023).

Water management methods have been applied, as stated by participants P1, P2, and P4. In addition, all participants emphasized the university's "Zero-waste campaign," which aims to promote waste management and minimize waste production. P1, P3, P4, and P5 explicitly stated that the university collects waste and converts it into compost, so showcasing its dedication to sustainable waste management procedures. According to Sadoff et al., (2020), water management is becoming increasingly important for environmental conservation, and the adoption of rainwater collecting systems offers a practical alternative for sustainably using water. Rainwater harvesting is collecting and storing rainwater for later use, such as gardening, flushing toilets, or supplementing drinking water supplies. Pierce et al., (2020) stated that through the process of catching and recycling rainwater that would otherwise be lost as runoff, these systems actively contribute to water conservation initiatives and alleviate the burden on municipal water supplies. In addition, rainwater harvesting systems adhere to the ideals of environmental stewardship by encouraging the efficient utilization of a natural resource and reducing the environmental consequences linked to water treatment and distribution procedures (Abu Qdais et al., 2019).

Waste management is an essential aspect of environmental stewardship, and this university has implemented aggressive methods to tackle this matter. The institution has initiated a zero-waste initiative on campus to minimize unnecessary garbage disposal and encourage sustainable habits. Gade and Aithal (2021) said the purpose of this program is to promote a mindset among the university community, which includes students, faculty, and staff, that focuses on reducing waste production and adopting appropriate waste management techniques. This university has adopted a composting effort as an additional measure to minimize trash, in addition to their existing zero-waste drive. The waste gathered on campus is not simply disposed of, but rather recycled and converted into compost that is abundant in nutrients (Vazquez et al., 2020). The compost can be used for landscaping and gardening, supporting the university's initiatives to preserve green spaces and foster a sustainable environment.

### **3.3 Sustainable Operations**

Transportation is a vital component of an institution's sustainable operations, as it encompasses different parts of its everyday tasks. This institution has actively promoted the utilization of bus services on its campus, acknowledging the significance of minimizing the environmental consequences linked to mobility (P1, P2, P4, P5, P6). Fachrudin (2020) cited that this effort not only encourages the adoption of environmentally friendly commuting methods but also helps decrease the number of automobiles on campus, thereby alleviating traffic congestion and minimizing the production of hazardous pollutants.

Carbon monoxide is a noxious pollutant that can have adverse impacts on both human health and the environment (Gonzalez-Feliu et al., 2018). The university is implementing a measure to decrease the number of automobiles on campus, which is a proactive effort to enhance air quality and establish a more sustainable environment for its community. The institution's focus on sustainable transport is in line with its broader goals of environmental stewardship and showcases its commitment to encouraging eco-friendly practices in all areas of its operations (Dodd et al., 2024).

Their dedication to sustainable operations includes a crucial focus on advocating for eco-friendly building approaches (P3, P5, P6). According to Singh et al., (2020), as part of this endeavor, the institution has deployed energy-conservation measures throughout its facilities, including the installation of light sensors. These sensors autonomously regulate lighting intensity by considering occupancy and the availability of natural light, hence preventing unnecessary use of lights. This institution has decreased its ecological footprint and achieved cost savings and resource conservation by optimizing energy use through intelligent lighting control. This initiative showcases the university's commitment to integrate sustainable design principles into its constructed surroundings (Mansur et al., 2021)

They also have adopted the concept of paperless offices as part of its commitment to sustainable operations and reducing its environmental impact (P3, P5). This effort seeks to substantially decrease the use of paper on a big scale in the administrative and academic areas of the university (Shah et al., 2019). In addition, the institution promotes the submission of assignments in digital or softcopy format, thus reducing the

requirement for physical hard copies (Umaima and Hutabarat, 2021). This university has adopted digitized workflows and modern technologies to decrease its dependence on paper and improve the efficiency and environmental sustainability of its operations. This digital method is in line with the university's pledge to sustainable practices, showcasing its devotion to diminishing resource usage and mitigating its environmental footprint.

### **3.4 Community Involvement**

University of Malaya places great importance on community involvement as a fundamental component of its commitment to the adoption of sustainable practices (Buana et al., 2018). An outstanding feature of this engagement is the proactive involvement of student organizations in several campaigns and projects conducted within the university (P1, P2, P3, P4, P6). The university promotes a sense of ownership and empowerment among its students by including them in various student clubs (Gomez and Derr, 2021). This collaborative approach not only increases knowledge but also fosters a culture of ecological accountability among the younger generation.

Moreover, University of Malaya acknowledges the significance of engaging stakeholders to accomplish its sustainability objectives. To achieve this objective, the institution has established collaborations with Non-Governmental Organisations (NGOs) that have expertise in environmental and sustainability activities (Finlay and Massey, 2012). These relationships enable the institution to exchange knowledge, resources, and best practices with other organizations, allowing them to benefit from the expertise and experience of these organizations (P2, P4, P5). Through close collaboration with NGOs, this institution can enhance its influence and extend its reach, while simultaneously making valuable contributions to the wider sustainability movement through coordinated endeavours and collaborative campaigns or initiatives (López, 2013).

This institution has placed great importance on fostering community awareness as a crucial element of its commitment to environmental stewardship and sustainable practices (P3, P5, P6). Cline et al., (2022) stated that the institution acknowledges the influence of public involvement and has implemented proactive measures to arrange events and exhibitions that foster chances for communities to come together to support sustainable endeavors. These programs provide opportunities for persons from many backgrounds to unite, gain knowledge about environmental concerns, and actively engage in projects that support sustainable lifestyles. By engaging the wider community, the university not only increases knowledge and understanding but also encourages a shared feeling of accountability and empowerment to bring about beneficial transformations (Ribeiro et al., 2020).

Furthermore, this institution acknowledges the importance of knowledge dissemination as a catalyst for raising community awareness (P3, P5, P6). According to research conducted by Abubakar et al., (2016), to achieve this goal, the university has established platforms such as community centers, which facilitate the exchange of information, sharing of best practices, and learning from each other's experiences. These interactive venues foster knowledge sharing and encourage a collaborative approach to addressing environmental issues. By providing these platforms, the university empowers communities with the essential tools and resources to make informed decisions and adopt sustainable practices in their daily lives (Murray, 2018).

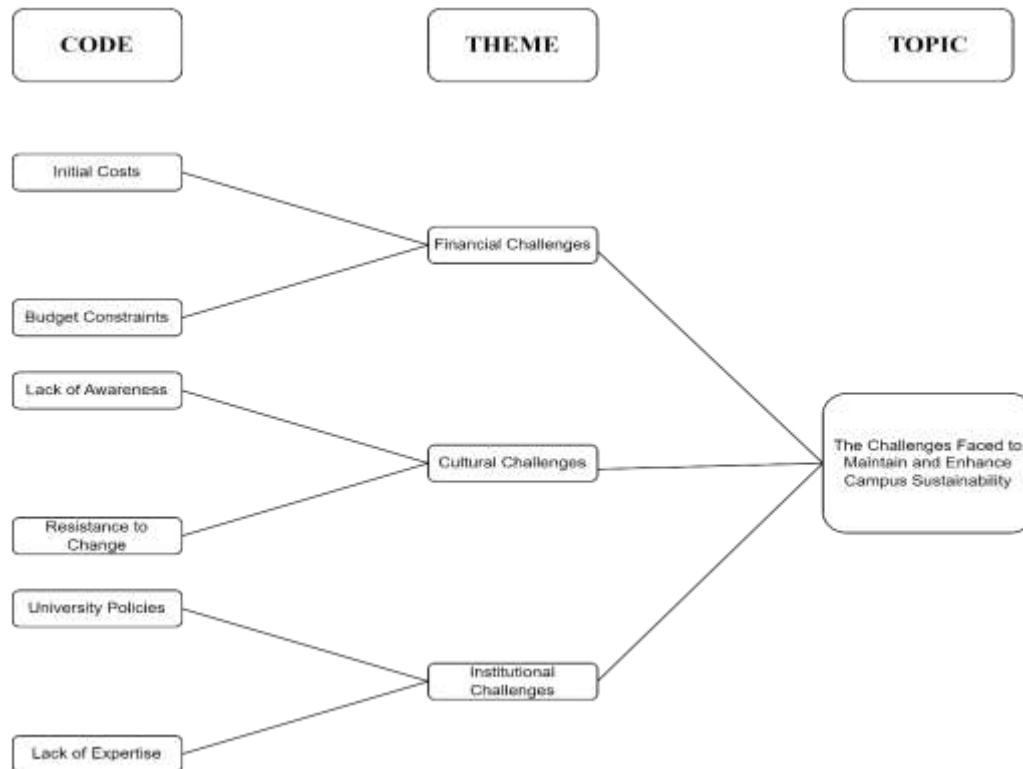
### **3.5 Challenges Faced to Maintain and Enhance Campus Sustainability**

The information presented in Figure 2 classifies the challenges faced by this university to maintain and enhance campus sustainability into three primary themes: institutional, cultural, and financial problems.

### **3.6 Financial Challenges**

Striving for sustainability frequently entails substantial financial challenges (Moqbel et al., 2020). The considerable upfront expenses are linked to the implementation of environmentally friendly projects and initiatives. Various sustainable solutions, such as solar panels or energy-efficient construction materials, necessitate significant initial investments that may be impractical for individuals, organizations, and even governments with constrained budgets. The high initial cost might significantly discourage the widespread implementation of sustainability measures, despite the clear long-term advantages they offer (Horhota et al., 2014).

Having limited funds is one of the biggest obstacles to implementing campus sustainability programs and keeping them going. Participants like P1, P3, P4, and P6 said that the relatively high initial expenditures limit the implementation of sustainability projects. All of the participants also emphasized how challenging it is to manage and sustain sustainability programs with tight finances.



**Figure 2.** Challenges to Maintain and Enhance Campus Sustainability

### 3.7 Cultural Challenges

The cultural challenge to promoting sustainability on campus is the community's limited awareness and understanding of the notion (Kagawa, 2007). Many people may lack a complete understanding of the importance of sustainable practices or the lasting effects of their actions on the environment. Disterheft et al., (2015) stated the absence of consciousness of sustainability projects can result in a general sense of apathy or indifference, which in turn makes it difficult to obtain broad support and engagement from the campus community. If individuals lack a basic comprehension of the significance of sustainability, they may give higher priority to other matters, unintentionally promoting unsustainable behaviors or failing to recognize chances to enact beneficial transformations.

This includes the college community's ignorance of and resistance to change (Lad and Akerlof, 2022). It is a common manifestation of cultural challenges, especially in academic societies where students, faculty, and staff are involved (Disterheft et al., 2015). Numerous things, such as deeply rooted habits, apprehension about the unknown, and mistrust of novel approaches, particularly those about sustainability, might contribute to this resistance (Conner et al., 2018).

This is consistent with P3, P4, and P5 which emphasized that one issue is that community people don't fully grasp the idea of campus sustainability. In addition, P1, P3, and P5 stated that students' ignorance of campus sustainability measures is partly caused by their lack of exposure and awareness.

### 3.8 Institutional Challenges

Institutional challenges in universities often arise from the frequent changes in top management, which can lead to inconsistent leadership policies (Stephens et al., 2008). Comprehensive sustainability policies may be developed and implemented more difficultly because of this unpredictability. McNamara (2010) stated that

new leaders can cause uncertainty and impede progress by bringing with them different goals and approaches, which can cause ongoing efforts to lose steam or stop completely. Universities need to create strong, institutionalized frameworks for sustainability that go beyond changes in individual leadership to lessen this. This entails integrating sustainability objectives into the university's main goals and activities and making sure that all organizational levels support, establish, and explain policies clearly and concisely (Disterheft et al., 2015). To preserve continuity and guarantee that sustainability initiatives are continued and enforced, regardless of who is in charge, it might also be helpful to establish specialized sustainability committees or positions that hold steady despite leadership changes.

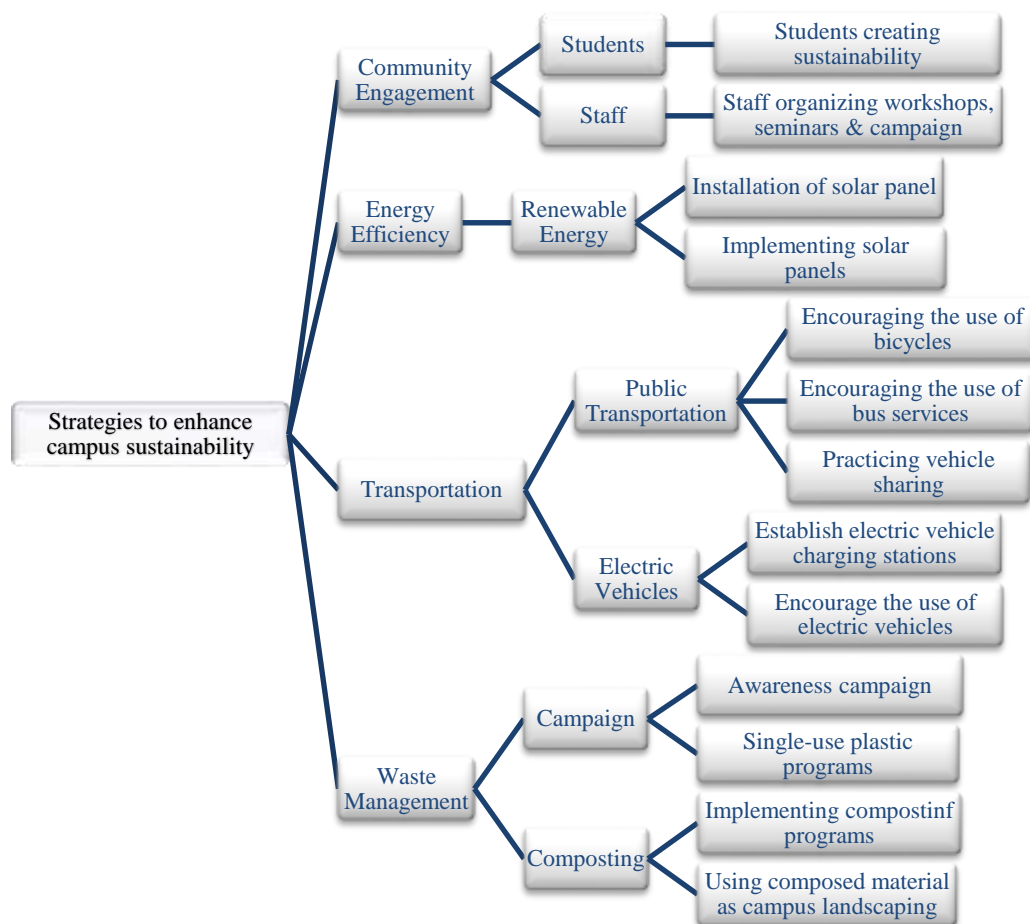
The absence of knowledge and university policies are the main topics of discussion in this section. Participants such as P1, P2, P3, and P5 brought up the issue of how regular changes in top management result in ongoing adjustments to leadership policies, which can cause disruptions to sustainability initiatives.

Ling et al. (2021) cited that one of the most common institutional challenges faced by universities is the shortage of professionals with the know-how to organize and carry out sustainability initiatives on campus. The lack of qualified personnel in fields like environmental science, sustainable engineering, and project management might hinder the advancement of sustainability programs (Gandasari et al., 2020). Universities may find it difficult to develop and implement comprehensive sustainability plans without the right staff, which could result in wasteful spending and less-than-ideal results. Universities can close this gap by funding professional development for current employees, encouraging collaborations with outside groups and experts, and aggressively seeking out candidates with the necessary experience (Gomez and Yin Yin, 2019). A future workforce with the abilities required to lead and support campus sustainability initiatives can also be developed by including sustainability education into the curriculum, assuring institutional resilience and long-term progress. Furthermore, participants like P2, P3, P5, and P6 mentioned that one major obstacle is the lack of experience in organizing and carrying out sustainability projects on campus.

### **3.9 Strategies to Enhance Campus Sustainability**

This subsection discusses the strategies to enhance campus sustainability at the University of Malaya. There are four (4) themes consisting of community engagement, energy efficiency, transportation, and waste management. This theme aims to involve staff members and students in the university's sustainability initiatives. Participants recommended that to encourage sustainable practices among their peers, students form clubs and committees dedicated to sustainability. To raise awareness and educate the campus community about sustainability, university officials should host conferences, seminars, and campaigns as follows:





**Figure 3.** Strategies to Enhance Campus Sustainability

### 3.10 Community Engagement

Community engagement is crucial for the success of sustainability initiatives on university campuses, and students play a pivotal role. Participants such as P1, P2, P4, and P5 recommended that to encourage sustainable practices among their peers, students form clubs and committees dedicated to sustainability. In addition, they (P1, P3, and P5) said that to raise awareness and educate the campus community about sustainability, university officials should host conferences, seminars, and campaigns.

According to Lozano et al., (2015), students can encourage an academic community that is environmentally conscious and advocates for environmental issues by starting sustainability committees and organizations. Through various activities and events, these student-led clubs can operate as platforms for teaching peers, advocating sustainable habits, and increasing awareness. They can plan seminars, recycling campaigns, clean-up drives, and energy-saving initiatives, all of which will directly support the university's sustainability objectives.

Additionally, by granting them a sense of agency and control over their school environment, sustainability committees and clubs empower students. Participating in these groups can help students develop their leadership abilities, increase their understanding of sustainability issues, and provide a feeling of belonging and purpose (Sepasi, 2018). Besides that, the involvement of staff members is vital to the process of integrating sustainability into university life, through planning workshops, seminars, and campaigns (Bacelar-Nicolau, 2023). These programs can inform and uplift staff members, lecturers, and students about the value of sustainable living and the doable actions they can take to make a difference. While seminars can bring in experts to discuss the latest research and trends in sustainability, workshops can provide hands-on experience in topics like energy saving (Fatini et al., 2023), sustainable food practices, and waste reduction. Campaigns have the power to unite the community around particular objectives, like cutting carbon emissions or raising recycling rates, and they can inspire a sense of shared accountability and initiative (Herth and Blok,

2022). Staff members may foster a more knowledgeable, involved, and proactive campus community that is dedicated to sustainability by making these efforts.

### 3.11 Energy Efficiency

Participants such as P1, P3, P4, and P6 suggested installing more solar panels on campus and equipping buildings with solar water heating systems. By taking these steps, the university hopes to lower its dependency on non-renewable energy sources and move towards a more sustainable energy profile.

As mentioned by Zhou et al., (2021), solar panels can be carefully positioned on rooftops, carports, and other buildings to optimize the capture of solar energy. This not only aids in producing a significant percentage of the university's electricity requirements but also acts as a tangible demonstration of the institution's dedication to sustainability, motivating both the campus community and others (Zulfa, 2023). Moreover, the incorporation of solar energy can result in substantial long-term cost reductions, diminishing reliance on finite energy sources and alleviating the economic consequences of volatile energy costs (Bayoumi, 2018).

Installing a solar water heating system on campus enhances these initiatives by targeting a significant energy-consuming aspect such as water heating (Fitria Avicenna et al., 2023). Solar water heating systems are suitable for use in dorms, dining halls, and sports facilities, offering a sustainable and economically efficient solution for meeting hot water requirements. These systems decrease the dependence on traditional water heating technologies, which are frequently energy-intensive and environmentally harmful (Wei, 2021). Universities can achieve significant savings in greenhouse gas emissions and operational expenses by using solar thermal energy. Furthermore, these installations function as educational instruments, providing students with hands-on learning experiences about renewable energy technologies and their practical uses (Shafie et al., 2022).

### 3.12 Transportation

Promoting sustainable transportation options on campus is vital for reducing environmental impact and fostering a culture of health and wellness among students. Promoting the utilization of bicycles for commuting to class or for physical activity is a very efficient method to reduce dependence on motor vehicles, thereby leading to a reduction in carbon emissions (Fatini et al., 2023) and alleviating traffic congestion (Fachrudin, 2020).

Furthermore, P1, P2, and P5 participants recommended endorsing carpooling and vehicle-sharing as optimal approaches for environmentally friendly transportation. Ahmad et al. (2022) cited that universities may facilitate this approach by offering many bicycle racks, designated bicycle lanes, and secure storage facilities. In addition, arranging riding events and safety training might further incentivize students to embrace biking as their main means of transportation. This not only fosters environmental sustainability but also enhances students' physical fitness and overall well-being.

Equally crucial is the promotion of utilizing bus services and carpooling among students and staff. Universities can reduce the environmental effect by improving the accessibility and frequency of campus bus services, making public transport a more convenient and appealing choice, hence decreasing the number of individual car trips (Sundram et al., 2021). Introducing a carpooling system can also be extremely advantageous, enabling connections among students and staff members who go from nearby locations. This not only reduces the number of automobiles on the road but also promotes a feeling of community and collective responsibility for sustainability. To further increase involvement in these efforts, offering incentives such as reserved parking for carpoolers or subsidized bus passes can be quite effective. By implementing these strategies, colleges can greatly enhance their efforts to achieve transportation sustainability objectives, resulting in a more streamlined and environmentally friendly campus setting.

Incorporating electric vehicles (EVs) into campus transportation networks is a forward-thinking measure aimed at improving sustainability and decreasing carbon emissions. Implementing electric vehicle charging infrastructure throughout the campus not only caters to existing electric vehicle users but also fosters a greater inclination among students, teachers, and staff to switch to electric vehicles (Ridhosari and Rahman, 2020). The university's decision to invest in this infrastructure demonstrates its dedication to sustainable practices and offers essential assistance for an increasing population of electric vehicle owners. In addition, advocating for the utilization of electric campus cars for maintenance, security, and shuttle services can substantially reduce

the consumption of fossil fuels and the emissions of greenhouse gases. These combined efforts contribute to a cleaner and more sustainable campus environment, while also establishing the university as a frontrunner in the use of environmentally friendly technologies.

### **3.13 Waste Management**

Strengthening awareness campaigns focused on recycling programs is crucial for effective waste management on campus as suggested by P1, P2, P3, P5, and P6. By disseminating knowledge to the university community regarding the significance and techniques of recycling, these programs have the potential to substantially diminish the quantity of garbage that is disposed of in landfills (Gallardo et al., 2016). In addition, highlighting the harmful effects of disposable plastics and advocating for substitutes can effectively reduce the production of solid waste. These campaigns may involve conducting workshops, displaying informative posters, launching social media initiatives, and organizing events that emphasize the environmental advantages of reducing, reusing, and recycling. By promoting a culture that prioritizes sustainability and accountability, these awareness initiatives can result in more mindful actions and a significant reduction in waste on campus, ultimately making a positive impact on the environment.

In addition, majority of the participants (P1, P3, P4, and P6) suggested starting composting programs for food waste from campus cafes. For instance, P1 and P6 participants proposed closing the loop and advancing a circular economy strategy by using composted material for campus landscaping. This is consistent with Alshuwaikhat and Abubakar (2008) who highlighted that through the diversion of organic waste from landfills, these programs effectively mitigate greenhouse gas emissions and enhance soil health. Cafes can gather food waste, coffee grounds, and other organic substances, which are subsequently composted either at the cafe itself or at a specifically assigned facility. This not only reduces the ecological footprint of food waste but also fosters a circular economy by transforming trash into a profitable asset.

Using composted material for campus landscaping improves the sustainability of waste management procedures. Soil that has been enhanced with compost enhances its structure, fertility, and ability to retain water, which in turn promotes more robust plant development and decreases reliance on artificial fertilizers. According to Muniandy et al. (2021), utilizing compost for landscaping enhances the aesthetic appeal of the campus surroundings, while also showcasing a dedication to sustainable methodologies. Furthermore, engaging students and staff in the composting process through instructional programs and volunteer opportunities cultivates a feeling of responsibility and community involvement in trash reduction initiatives. Incorporating composting programs into campus waste management strategies has the dual benefit of reducing landfill waste and enhancing the campus environment, while also encouraging responsible environmental practices.

### **3.14 Suggestions to enhance the level of sustainability at University of Malaya**

Enhancing sustainability in institutions of higher education is vital to fostering vibrant and harmonious environments that address current challenges and ensure future resilience. To achieve this, institutions must implement measures that integrate community engagement, energy efficiency, sustainable transportation, and waste management within their broader sustainability goals.

The research by Sugiarto et al. (2022) highlights the necessity of a comprehensive approach to campus sustainability, combining environmental, social, and economic dimensions to foster enduring benefits. Haddock-Fraser and Gorman (2023) emphasize the importance of engaging university leadership and stakeholders in shaping sustainability agendas. This involvement fosters ownership and accountability in implementing practices such as renewable energy use, low-emission transportation systems, and robust waste management programs. Similarly, Amey et al. (2020) advocate for active participation by administrators, faculty, staff, and students through effective communication strategies, further solidifying sustainability efforts.

Dawodu et al. (2022) propose a holistic strategy for assessing and enhancing environmental management practices on campus. This strategy includes promoting energy-efficient buildings, supporting public and non-motorized transportation options, and optimizing waste management systems to minimize landfill contributions while maximizing recycling and composting efforts. Incorporating community engagement

strengthens these initiatives by involving local residents and businesses in collaborative efforts, such as shared transportation networks or waste reduction campaigns.

In conclusion, creating sustainable campuses requires a multifaceted and collaborative approach. By aligning the knowledge and actions of stakeholders, fostering dialogue, and integrating energy efficiency, transportation systems, waste management, and community involvement, universities can serve as models for sustainability. These efforts not only enhance environmental stewardship but also cultivate a culture of sustainability within the broader campus community.

#### 4.0 CONCLUSION

The adoption of a holistic and integrated approach that considers a variety of factors of sustainability is necessary to cultivate a truly sustainable campus environment. This involves the implementation of energy-efficient practices, the promotion of renewable energy sources, and the encouragement of sustainable transportation options. Additionally, there should be a deliberate effort made to limit the amount of garbage that is generated, improve recycling activities, and promote water conservation measures across the entire campus. It is possible to make further contributions to the overall sustainability goals by incorporating sustainable design ideas into the infrastructure and landscape of the main campus.

The development of a mindset that is focused on sustainability among the members of the campus community is also of equal importance. It is possible to accomplish this through the implementation of instructional programs, awareness campaigns, and the active participation of students, teachers, and staff in activities about sustainability. One of the most important things that can be done to drive positive change is to encourage research and innovation in environmentally responsible activities. Through collaboration with local communities, government agencies, and industry partners, it is possible to facilitate the sharing of knowledge, the optimization of resources, and the application of best practices.

In a nutshell, a sustainable campus involves a commitment over an extended period as well as ongoing examination and development of tactics. It is possible to simplify the process of putting sustainability measures into action and evaluating their progress by establishing a dedicated sustainability office or committee. By conducting regular assessments and benchmarking against national and international standards, it is possible to identify areas that require development and ensure that the campus continues to be at the forefront of efforts to implement sustainability. By adopting these ideas, the institution will not only be able to contribute to the preservation of the environment, but it will also be able to serve as a model for sustainable practices in the larger community.

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