**Journal of Design and Built Environment**
E-ISSN: 2232-1500 |Print ISSN: 1823-4208
https://ejournal.um.edu.my/index.php/jdbe
Special Issue VI, 2025. Agile Cities: Creating an Enabling Ecosystem for Sustainable Cities. 01-22

# Towards a Sustainable Campus: A Review of Plans, Policies, and Guidelines on Sustainability in Malaysian Public Higher Education Institutions

**Nurzalikha Sa'adi[1,4*], Salfarina Abd Gapor[2], Faisal Tamrulan[1,3], and Asmah Alia Mohamad Bohari[1,4]**

[1]Research Centre for Borneo Regionalism and Conservation (BORC), University of Technology Sarawak, 96000 Sibu, Sarawak, Malaysia.

[2]School of Business and Social Science, Albukhary International University, 05200, Alor Setar, Kedah, Malaysia.

[3]School of Built Environment, University of Technology Sarawak, 96000 Sibu, Sarawak, Malaysia.

[4]College of Built Environment, Universiti Teknologi MARA Cawangan Sarawak, Kampus Samarahan, 94300 Kota Samarahan, Sarawak, Malaysia.

*Corresponding author: nurzalikha@uts.edu.my

**Article Info:**

Submission date: 28th August 2024
Acceptance date: 18th June 2025

**Keywords:**

Higher Education Institutions, Sustainable Action Plan, Sustainable Campus, Sustainable Initiatives.

**Abstract**

Higher education institutions (HEIs) are central to promoting and implementing a sustainability agenda. In Malaysia, fostering sustainability in campus development is gaining significance, addressing not only environmental but also social and economic dimensions of sustainability. Although many HEIs have committed to sustainable practices aligned with the Sustainable Development Goals (SDGs), a comprehensive evaluation of strategic planning for sustainable development within Malaysian public HEIs remains limited. To address this gap, this paper reviews 63 sustainability-related documents retrieved from the official websites of 20 Malaysian public HEIs from 2018 to 2023. These documents, comprising 32% policies, 41% reports, and 27% blueprints, were analyzed using a qualitative methodology based on web document analysis. The research reveals that 85% of Malaysian HEIs have adopted a Sustainability Action Plan, demonstrating strong overall commitment. Analysis using the community-colored bipartite network graph further highlights varied engagement with specific policies, showing that the Sustainability Action Plan is widely adopted, whereas initiatives such as Green Procurement and Sustainable Development Goals (SDGs) Alignment have limited uptake. This variation presents opportunities for less engaged HEIs to improve their sustainability efforts by learning from best practices. Overall, this study offers important evidence that advances the understanding of sustainability practices in higher education, highlighting the pivotal role of public universities in driving a more sustainable and conscientious campus development landscape.

## 1.0 INTRODUCTION

Recently, there has been growing attention toward integrating sustainability into the operations of higher education institutions (HEIs). This trend aligns with global commitments to sustainable development; however, a significant research gap remains in the comparative analysis of best practices within Malaysia's tertiary education sector (Abdul Nifa et al., 2014). This gap has sparked debate regarding the effectiveness of campus sustainability initiatives and their actual contributions toward broader sustainability goals (Christina et al., 2018; Badea et al., 2020). Moreover, no comprehensive and systematic study has been conducted specifically on sustainable initiatives by Malaysian HEIs (Razman et al., 2018). Since 2001, various assessment tools, such as the Sustainability Tracking, Assessment & Rating System (STARS), the Global Reporting Initiative (GRI) Standards, and the UI GreenMetric World University Rankings, have been employed to evaluate sustainability performance in HEIs. These tools have played a crucial role in advancing institutional sustainability assessments by measuring HEIs' performance across both administrative and academic activities (Disterheft et al., 2016; Kosta, 2019; Cámara et al., 2021; Ghasemy et al., 2023).

Achieving a sustainable society requires collective efforts that balance ecological, social, and economic well-being across communities. As key drivers of societal transformation, HEIs bear the responsibility to foster sustainability awareness and equip future leaders with essential knowledge and skills in sustainability (Abdullah et al., 2017). The transition toward sustainable HEIs depends heavily on human factors, including stakeholder engagement, leadership, organizational culture, and the role of change agents who drive sustainability initiatives (Mohamad et al., 2021). Adams et al. (2018) emphasize the importance of HEIs in cultivating sustainability by developing autonomous, independent, and self-reliant campus communities. These institutional commitments align closely with pressing global sustainability challenges. For example, Pedro et al. (2020) highlight how HEIs contribute to biodiversity preservation and its positive impact on sustainable development. Furthermore, Hasim et al. (2020) and Vargas-Merino et al. (2024) stress the vital role of HEIs in addressing environmental crises, particularly by mitigating the interconnected challenges of climate change and sustainable development through inclusive adaptation and mitigation strategies.

Nonetheless, HEIs often struggle to achieve their sustainability goals, such as integrating sustainability into curricula, reducing campus carbon footprints and fostering sustainable campus operations, due to misalignments between practical implementation and the institutional plans (Amaral et al., 2020). These implementation gaps underscore the urgent need for a systematic comparative study to evaluate strategies employed by Malaysian HEIs and identify best practices (Moganadas et al., 2020). In a world facing increasing environmental challenges, it is essential for HEIs to adopt effective sustainability practices. Although Malaysia consistently calls for environmental conservation, there remains a need to develop a stronger framework to guide campus sustainability initiatives, despite HEIs' existing commitments to global development goals. Mohd Muhiddin et al. (2022) and Salleh et al. (2020) highlight two critical integration challenges: a lack of stakeholder awareness and the absence of standardized frameworks and clear guidelines, both of which hinder effective implementation of sustainable initiatives on campuses. Furthermore, while the Malaysian Education Blueprint 2025 mandates the integration of Sustainable Development Goals (SDGs) within institutions, only 67% of HEIs currently treat sustainability as more than just a corporate social responsibility activity, limiting its role as a core operational strategy (Chan et al., 2023). These factors contribute to the inadequate practical implementation of sustainable development within Malaysian HEIs.

In recent years, sustainability has become a pivotal focus across various sectors, including education. Although numerous studies have explored sustainable initiatives in Malaysian HEIs, significant gaps remain in the existing literature that warrant further attention. Most research tends to emphasize assessing current practices and operational activities without establishing a strong conceptual foundation. For instance, Ismail et al. (2019) examined greenway development on campuses to support biodiversity and promote sustainable transportation, while Rahman et al. (2021) investigated the role of sustainability research centers in advancing sustainable knowledge. Additionally, Othman et al. (2020) highlighted how non-governmental organizations (NGOs) contribute to mobilizing campus community participation in environmental activities. Despite the increasing recognition of sustainable campus initiatives, several research gaps persist and require deeper exploration. The literature includes studies on both private and public Malaysian HEIs as well as global institutions, covering diverse topics such as educational sustainability (Md Din et al., 2021), transportation (Kaliani Sundram et al., 2021), building design (Abdul Nifa et al., 2015), carbon footprint reduction (Lim &

Hayder, 2019), environmental initiatives (Amaral et al., 2020), and campus operations (Xiong et al., 2020). However, there remains limited research focused specifically on the level of strategic planning in Malaysia, particularly regarding existing sustainability plans, policies and guidelines.

While substantial research exists on sustainable campus strategic planning in Malaysia, significant gaps and opportunities for further study remain. Addressing these gaps can support comprehensive sustainable campus initiatives by strengthening national and institutional frameworks. For instance, the Ministry of Higher Education launched the Education Institutions Sustainability Policy (Dasar Kelestarian Institusi Pendidikan Tinggi) in 2022, providing a sustainability framework aligned with the SDGs (Universiti Malaya Sustainability, 2022). Complementing this, Universiti Malaya introduced the UM Eco-Campus Blueprint and Zero Waste Campaigns to raise awareness on environmental protection, waste reduction, energy efficiency, and green infrastructure (UM Eco-Campus Blueprint, 2023). These initiatives foster greater stakeholder engagement and bolster sustainability efforts across campuses. In response, this study employed web document analysis, a systematic approach to reviewing digital materials, to examine institutional sustainability documents from 20 Malaysian public HEIs. The analysis focused on key documents such as Sustainability Action Plans (SCAPs), annual sustainability reports, strategic plans, guidelines, and policy frameworks, which collectively reflect institutional direction, policy adoption, and practical implementation. In addition, community-colored bipartite network graph combined with Louvain community detection was utilized to analyze the relationships between Malaysian public HEIs and their adoption of sustainability policies. This study contributes by systematically evaluating sustainability policy adoption and institutional commitment among Malaysian public HEIs, providing valuable review to strengthen the development and implementation of effective campus sustainability strategies.

## 2.0 LITERATURE REVIEW

### 2.1 Sustainable Development in Higher Education Institutions (HEIs)

Throughout the 21st century, the concept of sustainable development has expanded to encompass multiple dimensions, including environmental, economic, social, and technological aspects (Lawson, 2020). The Brundtland Report (1987) originally defined sustainability as meeting present needs without compromising the ability of future generations to meet theirs. This foundational idea has been reinforced by global frameworks such as the Millennium Development Goals (MDGs) and SDGs, which emphasize balanced progress and equitable outcomes across social and economic spheres. These frameworks also highlight the critical need for collaboration, especially within the tertiary education sector, a commitment reflected since 1990 in the Talloires Declaration. Within this broader context, Aleixo et al. (2018) emphasize that sustainable campus practices have become increasingly complex and interconnected, spanning teaching, research, and operational activities. Expanding on this complexity, Sonetti et al. (2017) propose a more holistic model of the "Sustainable University," outlining four essential pillars: enhancing the built environment, fostering engagement with civil society and industry partners, and leveraging public institutions for effective policy implementation. Together, these perspectives underscore the multifaceted nature of sustainability in higher education institutions today.

Recent studies have documented a range of sustainable campus initiatives that highlight both challenges and benefits. For instance, case studies like the "bike hub" project and social entrepreneurship development demonstrate meaningful contributions to sustainability efforts (Pedersen et al., 2017; Daub et al., 2020). Similarly, research by Zen et al. (2016) and Azzali & Sabour (2018) shows that green office initiatives and e-bike programs yield tangible benefits, including cost savings, improved campus traffic flow, and increased satisfaction among students and faculty. These findings resonate with efforts in the Malaysian context, where polytechnics emphasize comfort, health, green spaces, and safety as key priorities for fostering sustainable campus environments. At Universiti Kebangsaan Malaysia (UKM), for example, the goal has been to achieve a fully sustainable campus by 2020. Despite these ambitions, transitioning toward comprehensive campus sustainability continues to face considerable planning challenges. Berawi et al. (2018) underscore the critical role of reducing carbon emissions through the adoption of high-efficiency technologies, highlighting the importance of physical development planning. This is especially relevant given that compact campus models typically encounter fewer sustainability challenges compared to wide, dispersed campuses (Rodrigues da Silva et al., 2024). In Malaysia, Abd-Razak et al. (2011) identified contradictions in physical development planning

within research universities, revealing inconsistencies in implementation and a lack of a comprehensive sustainability framework, despite some institutions integrating sustainable practices. These findings point to the urgent need for an integrated planning approach that strengthens economic, social, and environmental sustainability across campuses. Accordingly, this study aims to evaluate the overall effectiveness of campus physical development planning in Malaysia by analyzing its efficiency and feasibility in creating sustainable campus living, while recognizing the existing challenges.

HEIs have played a pivotal role in advancing sustainable development, with their contributions evolving from Environmental Education (EE) to Education for Sustainable Development (ESD) and, more recently, Sustainability Science (SS) (Osman et al., 2005; Abdul Gapor et al., 2014). As key societal actors, HEIs are tasked with integrating sustainability principles across teaching, research, community engagement, partnerships, and institutional stewardship (Bashir et al., 2023). In this context, a 'green' or 'sustainable' university is one that embeds these principles holistically across all facets of operation (Dagiliute et al., 2018). A growing body of literature has explored this integration, with research focusing on areas such as sustainability reporting, curriculum development, and green campus initiatives (Bradley, 2019; Filho et al., 2019; Kohl et al., 2022; Duarte et al., 2023). Among these efforts, zero-waste initiatives in HEIs have emerged as practical strategies to reduce future waste generation by influencing current practices (Abdulghaffar & Williams, 2021). Moreover, Weiss et al. (2021) emphasize that sustainability is increasingly recognized as a multidimensional concept, extending beyond environmental concerns to encompass economic and social dimensions. This broader understanding reinforces the need for embedding sustainability into the academic curriculum, as cultivating holistic thinkers and problem solvers is essential for preparing future generations to address complex sustainability challenges.

### 2.2 Sustainable Campus Action Plan (SCAP)

Sustainable development has gained increasing prominence in Malaysia, particularly within HEIs, which are recognized as key agents in driving sustainability transformation. A core strategy facilitating this transition is the adoption of SCAPs, which aim to transform university campuses into sustainability hubs (Membrillo-Hernández et al., 2021). In Malaysia, as in many parts of the world, SCAPs reflect a broader shift in HEIs toward integrating sustainability across institutional practices and planning. This shift began in the early 2000s, when public HEIs started embedding SCAPs within their strategic plans as part of internal sustainability efforts (Rahman & Leman, 2018). During this initial phase, implementation was limited and institutional engagement remained relatively low. However, a notable turning point occurred when government policy began actively endorsing sustainability across all levels of higher education. A key development was the introduction of sustainability criteria by the Malaysian Qualifications Agency (MQA), making sustainability integration a requirement for institutional accreditation (Fadzil et al., 2016). In response, many Malaysian HEIs began formulating comprehensive SCAPs aligned with national sustainability goals. The concept of Sustainable Higher Education (SHE) or Sustainable Campus has since attracted increasing attention from institutional stakeholders, both globally and within Malaysia. Leading public universities such as Universiti Malaya (UM), Universiti Putra Malaysia (UPM), UKM, and Universiti Sains Malaysia (USM) have demonstrated notable progress in implementing SCAPs. Nevertheless, several challenges persist, including financial constraints, institutional inertia, and limited stakeholder participation (Fadzil et al., 2016). Furthermore, the lack of standardized assessment frameworks and benchmarking metrics hampers consistent evaluation of SCAPs effectiveness across institutions (Rahman & Leman, 2018).

The sustainability transformation of Malaysian HEIs gained formal traction in 2013, marked by a strategic shift toward the theme of "Universities and Sustainable Development" (Aris et al., 2018; Beynaghi et al., 2016). This transformation emphasized the implementation of green initiatives aimed at positioning HEIs as sustainable campuses. However, the development of campus operations at Malaysian public HEIs revealed that achieving sustainability requires more than compliance alone; while governance indicators are essential, it is the practical implementation of sustainable campus operations that has a greater impact on performance outcomes. This observation aligns with findings by Vargas et al. (2019), who argue that effective policy frameworks are necessary to overcome operational challenges and support the transition toward sustainable campus development. In parallel, Jehtae et al. (2021) underscore the growing importance of environmental sustainability studies, asserting that HEIs are well-positioned to lead by example in addressing global environmental challenges. Supporting this, Crosling et al. (2020) examine how sustainability in Malaysian

HEIs can foster environmental resilience, though they note that there are still gaps and areas in need of development, particularly in strengthening ESD practices across all levels. Their work contributes by highlighting the importance of transitioning sustainability from a conceptual goal in teaching and learning to a pedagogically grounded and actionable reality. Complementing this perspective, Rashad et al. (2020) explore Malaysia's strengths and opportunities as an emerging international higher education hub. They also assess the sustainability dimensions embedded within Malaysia's transnational higher education agenda, evaluating their role in advancing both domestic sustainability efforts and internationalization objectives.

Recent studies have revealed positive advancements in campus sustainability practices, student behavior, and community outreach initiatives. However, further research is needed to assess the specific outcomes and long-term effects of SCAPs within the Malaysian context. For instance, Daub et al. (2020) report that student-led sustainable innovation plans have yielded notable social and environmental benefits. Similarly, Sin Chan et al. (2022) identify three key operational outcomes resulting from SCAPs implementation: improved waste management systems, enhanced energy efficiency measures, and the integration of sustainability into academic curricula. These findings align with the assertion by Sturlaugson et al. (2019) that sustainability assessment and transparent reporting are essential for fostering a sustainable campus that upholds academic excellence. To ensure the effectiveness of SCAPs in Malaysia, a multi-dimensional approach is required, encompassing policy development, infrastructure planning, curriculum redesign, and national community engagement. Sin Chan et al. (2022) further emphasize that strong institutional leadership and collaboration with a broad range of stakeholders are critical to SCAPs success. In this regard, establishing dedicated sustainability departments or centers within HEIs can play a pivotal role in overseeing and coordinating these initiatives (Kamarudin et al., 2023). Despite the notable progress, Malaysia's SCAPs implementation has largely followed a fragmented path, with efforts varying across institutions. While success has been documented, persistent challenges remain, necessitating continuous commitment from HEIs, policymakers, and stakeholders alike (Ayub & Sharaabi, 2021). Accordingly, the establishment of a national monitoring framework is crucial to systematically evaluate the progress, effectiveness, and sustainability of SCAPs initiatives across Malaysian HEIs.

While the existing literature has explored sustainable development in HEIs globally, including in Malaysia, critical gaps remain in evaluating the effectiveness of SCAPs within the Malaysian context. Previous studies have identified persistent challenges, including inconsistent implementation of sustainable campus planning (Abd-Razak et al., 2011), limited stakeholder engagement (Fadzil et al., 2016), and the absence of standardized evaluation metrics (Rahman & Leman, 2018). Addressing these gaps, the present study introduces a novel and unified evaluation framework for SCAPs that integrates economic, social, and environmental dimensions specific to Malaysian public HEIs. The research novelty lies in its systematic evaluation of SCAPs components across Malaysian public HEIs through qualitative web document analysis of sustainable records. By identifying these, this research contributes practical recommendations for HEIs stakeholders and sustainable policymakers to strengthen the implementation of SCAPs. The findings will particularly address the need for improvement and provide comprehensive strategies for Malaysian HEIs align with their sustainability efforts and achieve the SDGs targets. Ultimately, this study helps to fill in the gap between practical implementation and SCAPs formulation in Malaysian HEIs.

## 3.0 METHODOLOGY

This study employed web document analysis as its primary research methodology. Similar to content analysis, web document analysis involves a systematic process of reviewing and evaluating various types of documents transmitted and accessed via the internet. This method was deemed appropriate as the research focuses on analyzing institutional sustainability documents rather than conducting a secondary analysis of publication trends. The types of documents analyzed include SCAPs, annual sustainability reports, strategic plans, sustainability guidelines, and policy frameworks. These documents were selected because they reflect institutional direction, demonstrate the level of sustainability adoption, and provide practical guidance for implementation. The analysis was limited to web-based documents, as most Malaysian HEIs publish their sustainability-related materials primarily on their official websites. Web documents also represent the most current and publicly accessible sources of institutional information. This approach enabled a consistent and systematic comparison across all 20 public HEIs in Malaysia using digitally available data. The process involved retrieving and examining documents directly from the official websites of the 20 institutions listed in Table 1.

**Table 1.** Official Website of Public HEIs in Malaysia.

| Malaysian Public HEIs | Official Website |
|---|---|
| Universiti Malaya (UM) | http://www.um.edu.my |
| Universiti Sains Malaysia (USM) | http://www.usm.my |
| Universiti Kebangsaan Malaysia (UKM) | http://www.ukm.my |
| Universiti Putra Malaysia (UPM) | http://www.upm.edu.my |
| Universiti Teknologi Malaysia (UTM) | http://www.utm.my |
| Universiti Islam Antarabangsa Malaysia (IIUM) | http://www.iiu.edu.my |
| Universiti Utara Malaysia (UUM) | http://www.uum.edu.my |
| Universiti Malaysia Sarawak (UNIMAS) | http://www.unimas.my |
| Universiti Malaysia Sabah (UMS) | http://www.ums.edu.my |
| Universiti Pendidikan Sultan Idris UPSI | http://www.upsi.edu.my |
| Universiti Sains Islam Malaysia (USIM) | http://www.usim.edu.my |
| Universiti Teknologi MARA (UiTM) | http://www.uitm.edu.my |
| Universiti Malaysia Terengganu (UMT) | http://www.umt.edu.my |
| Universiti Tun Hussein Onn Malaysia (UTHM) | http://www.uthm.edu.my |
| Universiti Teknikal Malaysia Melaka (UTeM) | http://www.utem.edu.my |
| Universiti Malaysia Pahang Al-Sultan Abdullah (UMPSA) | http://www.ump.edu.my |
| Universiti Malaysia Perlis (UniMAP) | http://www.unimap.edu.my |
| Universiti Sultan Zainal Abidin (UniSZA) | http://www.unisza.edu.my |
| Universiti Malaysia Kelantan (UMK) | http://www.umk.edu.my |
| Universiti Pertahanan Nasional Malaysia (UPNM) | http://www.upnm.edu.my/ |

(Ministry of Higher Education, 2023)

This study focuses on public HEIs in Malaysia, as they consistently dominate the top rankings in the UI GreenMetric index compared to private institutions. The selection of public HEIs also reflects their prominent role and visibility in national sustainability efforts. Relevant documents were retrieved from the official websites of dedicated sustainability centers or departments within each public HEI, which actively contribute to sustainable development, as detailed in Table 2. These specialized centers underscore the institutions' commitment to the United Nations SDGs and serve as focal points for coordinating sustainability initiatives. For example, UM established the UM Sustainable Development Centre (UMSDC) to provide a unified platform for addressing sustainability challenges. The UMSDC facilitates coherent action by integrating diverse environmental, social, and economic perspectives through an interdisciplinary approach. Similarly, USM founded the Center for Global Sustainability Studies (CGSS), emphasizing collaborative research and initiatives to tackle global sustainability issues. At UKM, the Institute for Environment and Development (LESTARI) play a central role in overseeing environmental conservation and sustainable development. UPM demonstrates its commitment through the SUSTAINABILITY@UPM initiative, which adopts a holistic framework encompassing various university functions. Universiti Teknologi Malaysia (UTM), through its UTM Campus Sustainability initiative, promotes sustainability advocacy across all aspects of campus life and integrates sustainability into the core operations of the university. These institutional efforts collectively illustrate a nationwide commitment among public HEIs to advance sustainability in alignment with global development agendas.

At the International Islamic University Malaysia (IIUM), the Sejahtera Centre for Sustainability and Humanity (SC4SH) was established to promote the SDGs, with a particular focus on integrating sustainability with human well-being. Universiti Utara Malaysia (UUM), on the other hand, emphasizes data-driven

approaches through its Centre for Testing, Measurement and Appraisal (CeTMA), aligning sustainability with robust evaluation and tracking mechanisms. Universiti Malaysia Sarawak (UNIMAS) demonstrates its sustainability leadership through the University Sustainability Centre (USC), which actively integrates sustainable development across various institutional functions. Similarly, Universiti Malaysia Sabah (UMS) adopts a comprehensive environmental strategy via its EcoCampus Management Centre, overseeing all facets of sustainability on campus. Universiti Sains Islam Malaysia (USIM) contributes to this national movement with the establishment of the Centre for Sustainability and Serenity, which uniquely blends environmental sustainability with psychological well-being. In support of green initiatives, Universiti Teknologi MARA (UiTM) established the UiTM Green Centre to spearhead environmentally friendly practices and sustainable development efforts. Universiti Malaysia Terengganu (UMT) operates Sustainable Campus UMT, using its online platform to promote awareness and engagement in sustainable practices among campus stakeholders.

Universiti Tun Hussein Onn Malaysia (UTHM) created the Sustainable Campus Office (SCO), a centralized body coordinating sustainability initiatives across its campus. Universiti Teknikal Malaysia Melaka (UTeM) set up the Centre for Sustainability and Environment to oversee campus-wide sustainability programs, while Universiti Malaysia Pahang Al-Sultan Abdullah (UMPSA) recently established its Sustainable Development Centre (SDC) in December 2023 to support its evolving sustainability agenda. Furthermore, institutions such as Universiti Malaysia Perlis (UniMAP) and Universiti Sultan Zainal Abidin (UniSZA) have introduced centers like the Centre of Sustainable Campus & Energy Management (COSCEM) and Lestari, respectively, indicating a growing academic consensus on the importance of institutionalizing sustainability and energy management practices aligned with the SDGs. However, among the 20 public HEIs surveyed, only Universiti Pendidikan Sultan Idris (UPSI) and Universiti Pertahanan Nasional Malaysia (UPNM) currently lack dedicated sustainability centers or departments. In general, Malaysian HEIs are making significant progress in aligning their institutional structures with the global sustainability agenda through the establishment of specialized centers. The diversity of institutional approaches reflects the multifaceted nature of sustainable development and underscores the importance of adopting integrated and context-specific strategies to achieve meaningful and lasting impact.

**Table 2.** Sustainable Centre/Department in Public Higher Education Institutions in Malaysia.

| Malaysian Public HEIs | Sustainable Centre/Department |
|---|---|
| Universiti Malaya (UM) | UM Sustainable Development Centre |
| Universiti Sains Malaysia (USM) | Centre for Global Sustainability Studies |
| Universiti Kebangsaan Malaysia (UKM) | Institute for Environment and Development |
| Universiti Putra Malaysia (UPM) | SUSTAINABILITY@UPM |
| Universiti Teknologi Malaysia (UTM) | UTM Campus Sustainability |
| Universiti Islam Antarabangsa Malaysia (IIUM) | Sejahtera Centre for Sustainability and Humanity |
| Universiti Utara Malaysia (UUM) | Centre for Testing, Measurement and Appraisal |
| Universiti Malaysia Sarawak (UNIMAS) | University Sustainability Centre |
| Universiti Malaysia Sabah (UMS) | UMS EcoCampus Management Centre |
| Universiti Sains Islam Malaysia (USIM) | Centre for Sustainability and Serenity |
| Universiti Teknologi MARA (UiTM) | UiTM Green Centre |
| Universiti Malaysia Terengganu (UMT) | Sustainable Campus UMT (Website) |
| Universiti Tun Hussein Onn Malaysia (UTHM) | Sustainable Campus Office |
| Universiti Teknikal Malaysia Melaka (UTeM) | Centre for Sustainability & Environment |
| Universiti Malaysia Pahang Al-Sultan Abdullah (UMPSA) | Sustainable Development Centre |
| Universiti Malaysia Perlis (UniMAP) | Center of Sustainable Campus and Energy Management |
| Universiti Sultan Zainal Abidin (UniSZA) | Lestari (Website) |
| Universiti Malaysia Kelantan (UMK) | Sustainable UMK (Website) |

The flowchart detailing the procedure for collecting documents from the official websites of 20 public HEIs in Malaysia is illustrated in Figure 1. The research process commenced with the identification stage, where the research scope and objectives were clearly established. This stage specifically focused on identifying all public HEIs in Malaysia along with their corresponding sustainability centers or departments. The sample size was determined to include all relevant institutions to ensure comprehensive coverage. Following identification, data collection was undertaken by retrieving sustainability-related documents from official institutional websites and documentation provided by the respective centers or departments. These documents were compiled into a comprehensive dataset. To ensure the accuracy and reliability of the collected data, each entry was cross verified using multiple credible sources, including official institutional portals, endorsed documents with verifiable publication dates, and archived materials from institutional repositories. This triangulated approach mitigates potential inconsistencies due to variations in website updates across Malaysian HEIs. At the same time, it maintains methodological robustness and strengthens the credibility of the web document analysis by ensuring that only current and authenticated documents were included in the study.

During the screening stage, clear criteria were established to assess documents for relevance and suitability, which include the publication date within the last 10 years, alignment with the objective of research and credibility of the source. This process resulted in the collection of documents for potential future analysis. Documents failing to meet the qualification being excluded. In the subsequent selection stage, the criteria were further refined to identify documents suitable for in-depth analysis, focusing particularly on those addressing SCAPs. From the selected documents, relevant data were extracted, synthesized to identify emerging patterns and trends, and validated through peer review or expert consultation to ensure accuracy. Out of the 20 Malaysian public HEIs, a total of 63 sustainability-related documents were systematically analyzed, covering the period from 2018 to 2023. These documents, retrieved from official institutional websites, are summarized in Table 3. The dataset includes 32% policies, 41% reports, and 27% blueprints, reflecting a diverse range of institutional approaches to sustainable campus planning. Each document was evaluated based on alignment with sustainability domains, evidence of measurable outcomes, and the level of institutional commitment. Quantitative analysis revealed that 78% of Malaysian public HEIs demonstrate formal sustainable commitments. The final selection of documents was carefully documented, including the rationale for inclusion and consideration of potential biases or limitations. This structured and transparent process guarantees the accurate identification of relevant HEIs and departments, alongside rigorous and systematic screening and selection of documents.

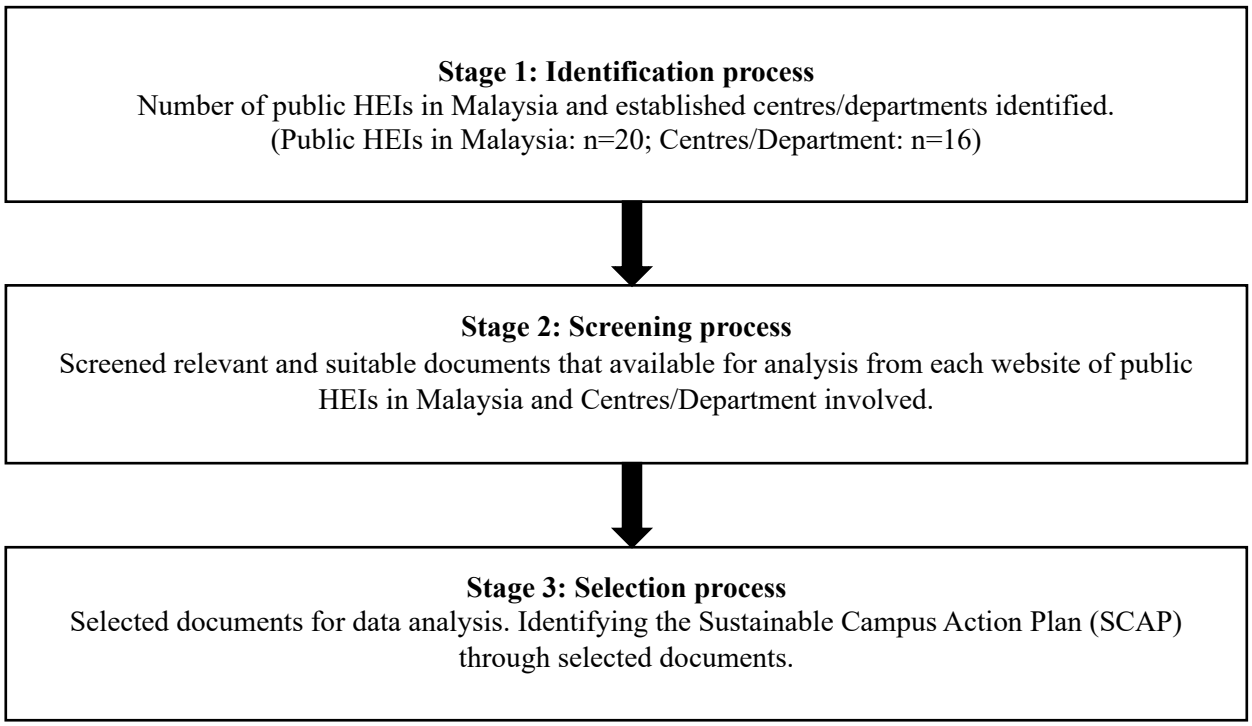


**Figure 1.** Process collection of documents for data analysis.

**Table 3.** List of Documents Retrieved

| Malaysian Public HEIs | Documents Retrieved |
|---|---|
| UM | 1. UM Sustainability Policy 2021-2030<br>2. UM Eco Campus Blueprint<br>3. UM Action Plan on Single Use Plastic and Disposable Items Reduction<br>4. UM Living Lab Guidelines |
| USM | 1. Sustainability Report 2018<br>2. The Sustainability-Led University<br>3. Governance Guidelines for Sustainability Best Practices<br>4. 5 Year Sustainability Action Plan<br>5. USM Sustainability Policy 2022<br>6. USM Tobacco Policy |
| UKM | 1. Climate Change Policy<br>2. Green Procurement Policy<br>3. UKM Sustainability Strategic Plan 2030<br>4. UKM's Net Zero Emission Target 2050 |
| UPM | 1. UPM Sustainable Transportation System Blueprint 2019-2024<br>2. E-waste Management in UPM<br>3. UPM Sustainability Report 2022<br>4. Green Policy UPM<br>5. UPM Policy (Energy Management) |
| UTM | 1. Energy Policy<br>2. Campus Sustainability Policy<br>3. Sustainability Blueprint 2030<br>4. Sustainability Report 2020<br>5. Sustainability Report 2022 |
| UUM | 1. Sustainability Bulletin<br>2. Sustainability Report 2020<br>3. Sustainability Report 2021<br>4. Sustainability Report 2022 |
| UNIMAS | 1. UNIMAS Low Carbon Campus Roadmap 2030<br>2. UNIMAS Sustainability Report 2021-2022<br>3. UNIMAS Energy Policy<br>4. Hazardous Waste Guideline |
| UMS | 1. UMS' Sustainable Energy Management Policy<br>2. Polisi Pengurusan Sisa Lestari UMS<br>3. UMS Sustainability Report 2019<br>4. UMS Sustainability Report 2020<br>5. UMS Sustainability Report 2022 |
| USIM | Blueprint Kelestarian USIM |
| UiTM | 1. Annual Sustainability 2019<br>2. Annual Sustainability 2020<br>3. LCC2030C UiTM Building Blueprint 2022<br>4. Environmental Sustainability Report 2021-2022<br>5. Sustainability Policy |

| | |
|---|---|
| UTHM | 1. Green Building Management Policy<br>2. Polisi Kelestarian Tenaga<br>3. Sustainability Policy<br>4. Sustainable Landscape Management Policy<br>5. Sustainable Mobility Management Policy<br>6. Sustainable Waste Management Policy<br>7. Sustainable Water Management Policy |
| UTeM | 1. Energy Management<br>2. UTeM Carbon Reduction Target<br>3. Strategic Plan UTeM 2023-2025 |
| UniMAP | 1. Sustainability Report 2020<br>2. Sustainability Report 2021<br>3. Sustainability Report 2022 |
| UniSZA | UNISZA Strategic Plan 2023-2030 |
| UMK | 1. UMK Environmental Policy<br>2. UMK Sustainable Development Goals Report 2021 |

## 4.0 FINDINGS & DISCUSSION

This research demonstrates that Malaysian HEIs are progressively developing strategies to integrate sustainability into their education systems and campus operations through dedicated centers and action plans. These efforts span various dimensions, including environmental conservation, energy efficiency, waste management, and social well-being. The adoption of Sustainable Action Plans, policies, and guidelines serves to institutionalize sustainability practices across university functions, encouraging low-carbon behavior, responsible consumption, and waste reduction. As shown in Table 4, the data analysis was based on the documents listed in Table 3, with the primary objective of identifying the Sustainable Action Plans implemented by each public HEI in Malaysia. For instance, the University of Malaya (UM) has demonstrated a strong institutional commitment through its comprehensive initiatives, including the UM Eco-Campus Blueprint (UMECB) and the Action Plan on Single-Use Plastics Reduction. These are supported by a wider range of policies such as the Sustainability Policy, Tobacco-Free Policy, and specific guidelines targeting food waste separation and plastic use. Additionally, UM has introduced green event guidelines and sustainable initiatives like Eco-Campus Living Labs, aimed at fostering innovation and community participation. These initiatives highlight UM's significant commitment to sustainability, particularly in the social and environmental domains. However, consistent with the findings of Zhang et al. (2024), UM's approach still reveals a gap in addressing economic sustainability.

USM has established a robust sustainability framework through its Sustainable Action Plan, which integrates three core components: The Sustainability Framework, APEX The Sustainability Roadmap and Assessment Methodology (SAM), and the Energy Efficiency Programme, all aligned with its social responsibility commitments. Reflecting its "walk-the-talk" philosophy, USM has institutionalized sustainable practices by implementing key policies such as the Policy on Sustainability, Water Reuse Policy, and Tobacco-Free Policy. This commitment is further reinforced through comprehensive governance guidelines and a framework for sustainability indicators, showcasing a systematic and structured approach toward achieving institutional sustainability. While USM demonstrates strength in the social and environmental domains, a notable gap remains in addressing the economic dimension, which offers opportunities for future enhancement. Similarly, UKM has shown strong commitment through its Sustainable Action Plans, which include the Bangi Campus Physical Development Master Plan, the Sustainability Strategic Plan (2020–2030), and a Net Zero Emission Target by 2050. These long-term strategies are supported by key institutional policies such as the Smoke-Free Policy, Green Procurement Policy, and Climate Change Policy, underscoring the university's dedication to environmental sustainability. Although specific operational guidelines are not publicly disclosed, UKM's commitment is evident through its strategic plans and targeted emission reduction goals. Additionally, UKM plays a leading role in Malaysia's Green & Sustainability Campus initiative, aligning with its mission

to safeguard the environment (Utaberta & Handryant, 2014). However, despite its notable efforts in the environmental domain, gaps remain in addressing social and economic aspects of sustainability, warranting further attention in future initiatives.

UPM has established a comprehensive set of Sustainable Action Plans, including the Transportation System Blueprint (2019–2024), a strategic initiative aimed at reducing carbon emissions within the campus. This is further supported by institutional policies such as the UPM Green Policy and additional policies on energy management and e-waste. UPM's sustainability efforts emphasize environmental stewardship, particularly in the areas of sustainable transportation and energy efficiency. However, despite this strong environmental focus, the current framework lacks emphasis on the social and economic dimensions of sustainability. Therefore, a more holistic and balanced approach is needed to advance UPM's sustainability agenda in future planning. Similarly, UTM has positioned itself as a national leader in sustainability through the implementation of its UTM Sustainability Blueprint 2030. This strategic plan integrates policies on energy efficiency and campus operations, reflecting the university's commitment to environmental responsibility. UTM emphasizes sustainability across its campus management practices, and while specific operational guidelines remain undisclosed, its commitment is evident through the blueprint. This aligns with findings by Din et al. (2021), who highlight UTM's proactive institutional strategies. However, like many other Malaysian HEIs, UTM's current initiatives are predominantly focused on the environmental dimension, with limited emphasis on social and economic aspects. This highlights a strategic opportunity for UTM to adopt a more integrated sustainability framework that equally addresses all three pillars, environmental, social, and economic.

IIUM has demonstrated a strong commitment to sustainability through its Sustainable Action Plans, which serve as a foundational guide for sustainable practices. Although specific implementation guidelines are not publicly available, the presence of a Sustainability Policy suggests an institutional framework supporting sustainability efforts. This lack of documented plans contrasts with peer institutions such as UM and UTM, which exhibit greater transparency in disclosing detailed strategies. Nevertheless, the adoption of a Sustainability Policy reflects IIUM's recognition of sustainability imperatives. To align more closely with global best practices, IIUM could strengthen its efforts by developing actionable plans that comprehensively address the social and economic dimensions of sustainability. Similarly, UUM has adopted a holistic approach to sustainability through its Living Campus Plan, which functions as the university's primary Sustainable Action Plan. This framework is designed to embed sustainability principles across campus operations, academic curricula, and community outreach initiatives. While detailed policy documents and guidelines are not publicly accessible, the Living Campus Plan reflects UUM's institutional commitment to fostering a sustainable living and learning environment. Like many other Malaysian HEIs, however, UUM's current focus remains largely on environmental initiatives, with limited emphasis on the social and economic pillars. This presents an opportunity for UUM to strengthen its sustainability framework by incorporating a more balanced and integrated approach. UNIMAS, on the other hand, has developed a robust institutional framework through its Sustainability Master Plan 2030, which aligns institutional goals with long-term sustainability targets. The university's strategic policies on energy efficiency and hazardous waste management underscore its strong commitment to addressing environmental challenges. While these efforts demonstrate leadership in environmental sustainability, there remains a noticeable gap in addressing the social and economic dimensions. Similar to IIUM and UUM, UNIMAS would benefit from expanding its sustainability framework to ensure a more holistic approach that equally encompasses all three pillars of sustainability, environmental, social, and economic.

UMS has demonstrated its commitment to sustainability through a comprehensive Strategic Plan that integrates sustainable energy policies and waste management protocols aimed at reducing the campus's ecological footprint. This approach reflects UMS's practical efforts to implement sustainability measures while addressing the unique environmental challenges of Borneo. However, consistent with broader trends observed among Malaysian HEIs, UMS's current sustainability initiatives remain predominantly focused on environmental domains, with limited attention to social and economic aspects. To enhance the effectiveness of its sustainability agenda, UMS would benefit from developing a more holistic strategy that equally emphasizes all three pillars of sustainability. USIM has also shown institutional commitment to sustainability through the adoption of a Sustainability Blueprint, which serves as its primary Sustainable Action Plan. Although specific policies and implementation guidelines are not publicly available, the blueprint likely

provides strategic direction for integrating sustainability into campus operations and governance. This lack of publicly accessible documentation contrasts with institutions like UTM and UKM, which demonstrate greater transparency through detailed disclosures of energy, waste, and procurement policies. Given USIM's Islamic identity, future improvements could include incorporating Islamic sustainability principles into the institutional framework alongside contemporary environmental practices. This integration would enable USIM to broaden its sustainability approach to include social and economic dimensions more explicitly.

UiTM has emerged as a key contributor to Malaysia's sustainability agenda through its Sustainable Action Plan, which includes the Strategic Plan 2025 and its active participation in the Low Carbon City 2030 Challenge. The university has implemented a range of sustainability-focused policies, such as those addressing energy management, the adoption of zero-emission vehicles, and the development of pedestrian-friendly campus infrastructure (Kaliani et al., 2021). These initiatives reflect UiTM's efforts to institutionalize sustainability within its operational and physical planning frameworks. Nevertheless, similar to institutions such as USIM, UTM, and UKM, UiTM's sustainability strategy remains predominantly oriented toward environmental concerns, with comparatively limited emphasis on the social and economic dimensions. This recurring pattern among Malaysian HEIs underscores the need for future strategies that embrace a more balanced and integrated approach across all three pillars of sustainability. UTHM also demonstrates a comprehensive approach to sustainability, supported by a wide array of policies covering sustainability, waste management, landscape management, mobility, water conservation, green building standards, pedestrian mobility, and energy efficiency. The institution's broad policy coverage indicates a strong institutional commitment to embedding sustainability into campus operations and infrastructure. Notably, UTHM's promotion of pedestrian-friendly infrastructure exemplifies a step toward incorporating social sustainability, extending its efforts beyond the environmental domain similarly prioritized by many Malaysian HEIs. However, despite these advancements, there remains a gap in the integration of economic sustainability elements, presenting an opportunity for future enhancement to ensure a more holistic and inclusive sustainability framework.

UTeM presents a comprehensive approach to sustainability through its well-structured and scheduled waste management policy, which focuses on waste reduction and aligns closely with broader sustainability goals. Although detailed documentation is limited in the public domain, the university's commitment to environmental stewardship remains evident through the practical policies implemented across campus. However, consistent with trends observed in other Malaysian HEIs, UTeM's sustainability efforts show a noticeable emphasis on environmental aspects, with less visible focus on social and economic dimensions. This lack of documented social and economic initiatives highlights an opportunity for UTeM to develop a more integrated and strategic sustainability framework in the future. Similarly, UniMAP demonstrates its engagement with sustainability through initiatives such as the Smoke-Free Policy, underscoring its dedication to fostering a healthy and sustainable campus environment. This policy reflects the institution's dual commitment to enhancing human well-being alongside environmental quality. Additionally, UniMAP adheres to the Government Green Procurement Guidelines, reinforcing its commitment to sustainable procurement practices. Nevertheless, evidence of initiatives targeting economic sustainability remains limited. To further strengthen its sustainability agenda, UniMAP could incorporate economic sustainability into its framework, thereby advancing toward a more holistic and strategic approach within Malaysia's higher education sector.

UniSZA has established the Green Campus Strategic Policy as a clear commitment to environmental stewardship and eco-friendly campus development. Although detailed documentation of their Sustainable Action Plans is not publicly available, the existence of this policy demonstrates their dedication to sustainability. However, further information is necessary to fully assess the scope and effectiveness of the institution's sustainability initiatives. The university's focus on energy efficiency, waste reduction, and sustainable landscaping reflects a predominant emphasis on environmental aspects, revealing a notable gap in the social and economic dimensions of sustainability. Integrating these two dimensions into future sustainable frameworks could significantly amplify UniSZA's contribution to Malaysia's higher education sustainability landscape. Similarly, UMK has developed a Green Campus Master Plan that serves as its comprehensive Sustainable Action Plan. The institution has implemented numerous environmentally friendly policies, including the 'No to Plastic' campaign, zero-emission vehicle initiatives, and pedestrian-friendly pathways, underscoring its commitment to minimizing environmental impacts. UMK also shares its Sustainable Development Goals (SDG) Manual, which emphasizes the importance of adopting a holistic sustainability

approach aligned with global objectives. While efforts to reduce waste and promote low-carbon mobility are well established, there remains limited emphasis on key SDG aspects such as affordable clean energy and inclusive sustainability education. To strengthen its position as a sustainability leader among Malaysian HEIs, UMK could broaden its focus to incorporate the social and economic dimensions of sustainability more comprehensively.

There are currently no specific Sustainable Action Plans, policies, or guidelines publicly available for UPSI, UMT, UPNM, and UMPSA. The lack of documented frameworks presents challenges in evaluating these institutions' approaches and commitments to sustainability. Therefore, additional data, such as interviews with campus sustainability officers, would be valuable for a more thorough assessment of their sustainability efforts. In summary, most Malaysian public HEIs demonstrate varying levels of commitment to sustainable development through more detailed Sustainable Action Plans and associated policies or guidelines, reflecting global trends noted by Filho et al. (2019). This analysis reveals that approximately 85% of Malaysian HEIs have adopted formal sustainability policies. Institutions like UM and USM exemplify a comprehensive approach by integrating economic, social, and environmental dimensions of sustainability across their campuses. Furthermore, comparative analysis shows that about 60% of Malaysian HEIs have published sustainability blueprints. However, these institutions still face challenges in fully aligning with the Sustainable Development Goals (SDGs) and engaging key stakeholders effectively. Guided by the global agenda established by the SDGs, these documents signify institutional recognition of the importance of sustainability in Malaysia's higher education sector. The presence of such plans underscores the growing commitment to addressing environmental, social, and economic objectives within Malaysian HEIs.

**Table 4**. Sustainable Action Plan implemented by each Public HEIs in Malaysia

| Malaysian Public HEIs | Sustainable Plans | Sustainable Policies | Sustainable Guidelines |
|---|---|---|---|
| UM | 1. Universiti Malaya Eco-Campus Blueprint (UMECB)<br>2. Pelan Pembangunan Eko-Kampus Universiti Malaya (UMECB)<br>3. Universiti Malaya Action Plan on Single-Use Plastics and Disposable Items Reduction (1st Edition, 2022) | 1. Universiti Malaya Sustainability Policy 2021 - 2030 (Second Version)<br>2. Universiti Malaya Sustainability Policy<br>3. Policy on Single-Use Plastics Banning and Food Waste Separation at Cafeteria / Food Premises UM 2019<br>4. Universiti Malaya Tobacco-Free Policy 2022 | 1. UM Green Events Guideline: A Guide to Running Green Meetings and Events (2023)<br>2. UM Eco-Campus Living Lab Guidelines: Step-by-Step Guidance Green Event (EcoCampus@UM), Landscape and Biodiversity (The Rimba Project), Waste (UM Zero Waste Campaign & Safe D.U.M.P), Water (Water Warriors UM), Energy (Energy Saving Culture), Transportation (Centre for Transportation Research), Green Procurement, Education Management (Green Mosque) & Change Management (UM Living Lab System) |
| USM | 1. USM Sustainability Framework<br>2. USM APEX Sustainability Roadmap<br>3. Sustainability Assessment Methodology (SAM) | 1. USM Policy on Sustainability<br>2. Water Reuse Policy<br>3. Tobacco Free Policy 2022 | 1. Governance Guidelines for Sustainability Best Practices<br>2. Sustainability Indicators: A Framework and Guidelines for Action |

| | | | |
|---|---|---|---|
| | 4. USM Sustainability Action Plan<br>5. USM Energy Efficiency Programme | | |
| UKM | 1. UKM Bangi Campus Physical Development Master Plan 2007-2020<br>2. Sustainability Strategic Plan Universiti Kebangsaan Malaysia 2020-2030<br>3. UKM's Net Zero Emission Target 2050 | 1. Smoke-Free Policy<br>2. Green Procument Policy<br>3. Climate Change Policy | Not available |
| UPM | 1. Sustainable Transportation System Blueprint 2019-2024 | 1. UPM Green Policy<br>2. Universiti Putra Malaysia Policy (Energy Management) 2018 | E-waste Management |
| UTM | UTM Sustainability Blueprint 2030 | 1. UTM Energy Policy<br>2. Campus Sustainability Policy | Not available |
| IIUM | Not available | IIUM Sustainability Policy | Not available |
| UUM | UUM Living Campus Plan | Not available | Not available |
| UNIMAS | UNIMAS Sustainability Master Plan 2030 | Energy Policy | Hazardous Waste Guidelines |
| UMS | UMS Strategic Plan | 1. UMS Sustainable Energy Policy<br>2. UMS Sustainable Waste Management Policy | |
| USIM | USIM Sustainability Blueprint | Not available | Not available |

| | | | |
|---|---|---|---|
| UiTM | 1. UiTM Strategic Plan 2025<br>2. Low Carbon City 2030 Challenge | 1. Sustainability Policy<br>2. UiTM Energy Management Policy<br>3. Zero Emission Vehicles (ZEV) Policy<br>4. Pedestrian Path Policy | Not available |
| UMT | Blueprint Sustainable Campus | Energy Management Policy | Not available |
| UTHM | Not available | 1. Sustainability Policy<br>2. Sustainable Waste Management Policy<br>3. Sustainable Landscape Management Policy<br>4. Sustainable Mobility Management Policy<br>5. Sustainable Water Management Policy<br>6. Green Building Management Policy<br>7. Pedestrian Mobility Sustainability Policy<br>8. Sustainable Energy Efficiency and Management Policy | Not available |
| UTeM | Not available | Solid and Scheduled Waste Management Policy | Not available |
| UniMAP | Not available | Smoke Free Policy | Government Green Procurement Guidelines 3.0 (GGP) |
| UniSZA | Not available | Green Campus Strategic Policy | Not available |
| UMK | UMK Green Campus Master Plan 2020-2025 | 1. UMK Environmental Policy<br>2. "No to Plastic" policy<br>3. Zero Emission Vehicles (ZEV) Policy<br>4. Pedestrian Path Policy | SDG Manual |

Figure 2 illustrates the connectivity between Malaysian HEIs and key sustainability policies. Each node in the diagram represents either an HEI (in light blue) or a sustainability policy (in orange), with lines indicating the engagement of institutions with specific policies. As shown, multiple HEIs have adopted similar sustainability policies, including Sustainability Policy, Energy Management, Waste Management, and

Sustainable Action Plans. Notably, the Sustainable Action Plan emerges as the most widely connected policy, implemented by several institutions such as UM, UMS, UTM, UNIMAS, UPM, and USIM, reflecting a strong national commitment to actionable sustainability frameworks in Malaysia. Moreover, some HEIs, including UM, UPM, UKM, UMT, and USM, are linked to multiple policies, demonstrating a more comprehensive approach to sustainability. In contrast, certain policies, such as Green Procurement, show limited adoption, connected only to UniMAP, while the Living Campus initiative is exclusive to UUM, the Strategic Plan to UiTM, and SDGs Alignment to UMK. Overall, this diagram highlights varying levels of sustainability engagement across Malaysian HEIs. Institutions with more extensive commitments can serve as exemplars of best practices, providing valuable lessons for those with fewer sustainability initiatives. This visual analysis offers guidance that can support Malaysian HEIs in strengthening and expanding their sustainable practices moving forward.

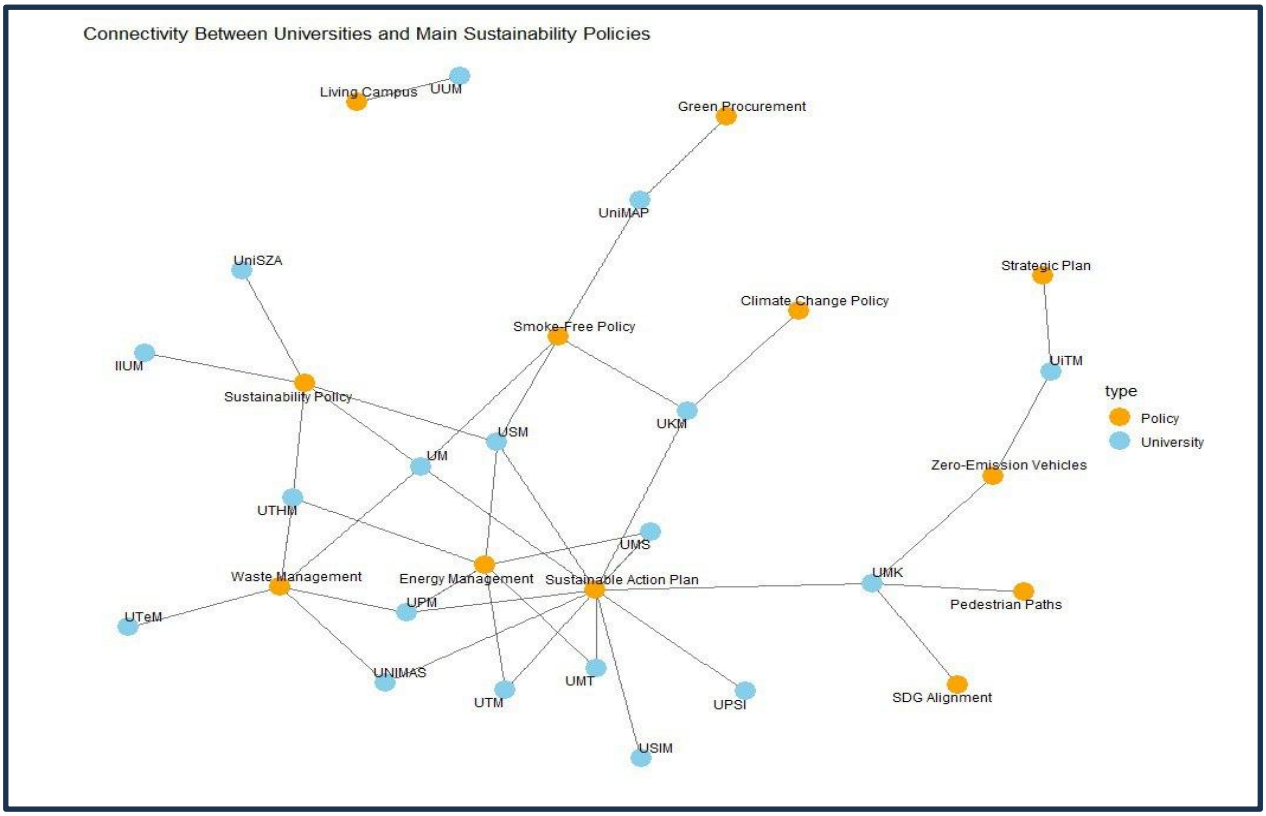


**Figure 2.** Network diagram showing the connectivity between Malaysian HEIs and sustainability policies.

Figure 3 illustrate the connections between Malaysian HEIs and sustainability policies using Louvain community detection. In the graph, HEIs are represented by triangles and policies by circles, with distinct colors indicating different communities. Six distinct communities emerge, each reflecting unique patterns of policy adoption. From the graph, Community 1 predominantly focuses on environmental-related policies such as Green Procurement, Smoke-Free Policy, and Climate Change Policy. Community 2 stands out as the most centrally connected cluster, strongly associated with Sustainable Action Plans and Energy Management. This group includes UTM, UMT, USM, UPM, USIM, and UMS, demonstrating a high level of commitment toward sustainability planning. Community 3, consisting of IIUM and UniSZA, is linked primarily to the Sustainability Policy, while Community 4 is solely represented by UUM with its Living Campus initiative, indicating limited adoption of this particular policy. In contrast, Community 5, centered on Waste Management, is only covered by UTeM, reflecting a more specialized but narrow focus. Finally, Community 6, which includes UiTM and UMK, is associated with multiple policies such as SDG Alignment, Zero-Emission Vehicles, and Pedestrian Paths. Overall, the diagram reveals varying degrees of sustainability engagement among Malaysian HEIs. The application of Louvain community detection effectively highlights distinct patterns and policy preferences, offering valuable connections into sustainable best practices within

the higher education sector. In conclusion, Malaysian HEIs are encouraged to develop more robust and comprehensive policy frameworks, with a greater focus on effective implementation. Such efforts will be critical to positioning Malaysia as a global leader in sustainability education.

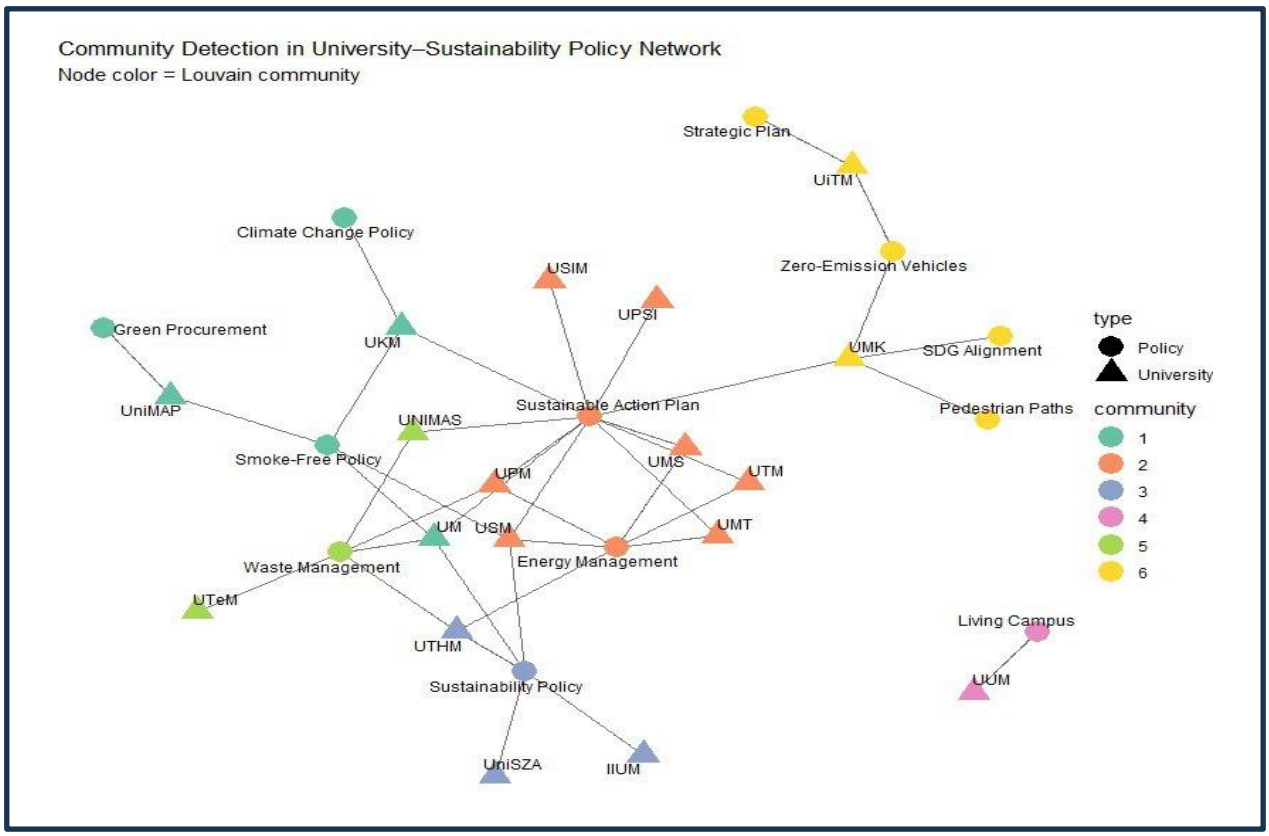


**Figure 3.** Community-Colored Bipartite Network Graph

## 5.0 CONCLUSION

In conclusion, Higher education institutions (HEIs) play a crucial role in shaping the values, behaviors, and practices of future leaders and professionals. By integrating sustainability into their core operations, HEIs embed environmental and social consciousness within their campuses, thereby fulfilling their responsibility to educate and inspire students, faculty, and staff. The establishment of dedicated centers or departments to oversee sustainability efforts in Malaysian HEIs exemplifies their alignment with the global SDGs. This institutional commitment ensures that diverse strategies are mainstreamed through Sustainable Action Plans and various policies and guidelines, harmonizing their operations with SDG objectives. Such a commitment is evident at all institutional levels, recognizing that sustainable development is multidimensional and demands a holistic approach. This proactive stance by public HEIs not only fosters long-term, practical change but also sets a valuable precedent for private institutions. The research highlights the significant role public HEIs play within the broader sustainability movement, providing evidence that they are advancing campuses towards greater environmental and social sustainability. This collective effort reflects a shared commitment to tackling global challenges such as climate change, environmental degradation, and economic sustainability. Together, these Sustainable Action Plans contribute to developing a more responsible and environmentally conscious higher education sector, addressing current challenges while preparing future generations to lead sustainability initiatives.

Nonetheless, this study faces several limitations. Firstly, there are notable gaps in document accessibility, with some institutions lacking publicly available or comprehensive sustainability plans, which restrict a full assessment of their commitment and progress. Secondly, there is a lack of detailed evaluations regarding the effectiveness, continuity, and real-world impact of the sustainability programs implemented. Thirdly, the study primarily focuses on policy and plan documentation without incorporating qualitative data from key

stakeholders such as university administrators, faculty, and students, which limits understanding of the practical challenges and successes in implementing these initiatives. Additionally, the scope is confined to public HEIs, thereby excluding the perspectives and practices of private institutions, which may differ significantly. To build on these findings and strengthen sustainability efforts across Malaysian HEIs, future research should pursue a more comprehensive approach. Comparative analyses between public and private HEIs would help identify successful models and gaps in sustainability implementation. Incorporating mixed-methods research, including interviews and case studies with campus sustainability officers and stakeholders, would provide deeper understanding into operational challenges and enablers. Longitudinal studies are also needed to evaluate the continuity and long-term impact of sustainability policies. Furthermore, expanding research to assess how well these institutions engage with local communities and integrate sustainability into curriculum and research could provide a more holistic picture of their overall sustainability contributions. Addressing these areas will be critical in improving sustainable practices and positioning Malaysia as a leader in sustainability within the higher education sector.

**ACKNOWLEDGEMENT**

The researchers would like to sincerely thank the University of Technology Sarawak (UTS) for their financial support. This research was facilitated by the UTS Research Grant (URG) under the reference UTS/RESEARCH/4/2023/01.

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