Keynote Speaker Article

Blueprint SmartGreen: Efforts in The Application Sustainable Development Goals Agenda in Malaysian Polytechnic and Community College System

Mohd Zamri Bin Jamaludin [*,1]

1 Sultan Idris Shah Polytechnic, Sungai Air Tawar, Selangor, Malaysia

* E-mail: **zamri_jamaludin@psis.edu.my**

ABSTRACT

In addressing the imperative of achieving the 2030 Sustainable Development Goals (SDGs) Agenda, the Department of Polytechnic and Community College Education (DPCCE) is actively committed to a proactive role. This commitment materializes through the transformation from the Polytechnic Malaysia Blueprint 2015-2020 (BPPM) to the Blueprint SmartGreen Polytechnic Community College 2021-2026 (BSGPC). While the preceding BPPM centered on ten Focus Areas (BT) related to green technology, the BSGPC adopts a more expansive approach by aligning with all 17 SDGs within seven Focus Areas. Formulating the problem at hand involves addressing the necessity for sustainable development in higher education institutions, specifically polytechnics and community colleges, with a focus on achieving the SDGs. The objective of this study is to critically examine the BSGPC's transformative impact on strategic management, project achievement targets, sustainable campus recognition, innovation and creativity enhancement, and collaboration strengthening with various stakeholders. The research methodology employs a combination of literature review and descriptive-explanatory analysis to comprehensively investigate the rationale, requirements, and potential outcomes of BSGPC. Preliminary findings indicate that BSGPC serves as a crucial reference and guide, setting the strategic direction for sustainable development initiatives in polytechnics and community colleges, not only within the Malaysian Ministry of Higher Education but also influencing broader educational institutions nationwide.

KEYWORDS

blueprint smart green; college; community; polytechnic; sustainable development goals

1. INTRODUCTION

Higher education institutions are characterized as entities with distinct organizational cultures and traditions (Ruiz-Mallén & Heras, 2020). Entities like Polytechnics and Community Colleges, which fall under the umbrella of higher education, play a pivotal role as catalysts for societal change, addressing challenges, risks, and the potential for sustainable development (Teichler, 2020). UNESCO-UNEVOC, within the realm of education, underscores the significance of Technical Vocational Education and Training (TVET) in fostering sustainable development (Subrahmanyam, 2020). This commitment is evident through various initiatives, publications, and declarations, including the United Nations Decade of Education for Sustainable Development (DESD) (Kohl et al., 2022). Notably, UNESCO-UNEVOC actively engages in capacity-building programs for TVET and Education for Sustainable Development (ESD) in Commonwealth nations (Kagawa, 2022). These efforts encompass sustaining the labor market through TVET, enhancing understanding of ESD, fostering stakeholder engagement in TVET, and facilitating the seamless integration of ESD into TVET through the UNEVOC network (Chinedu et al., 2023).

The Malaysia Department of Polytechnics and Community Colleges (DPCCE) is actively striving to establish itself as a premier Technical and Vocational Education and Training (TVET) institution (Rahim et al., 2023). Central to this effort is a focus on sustainable education and research management, essential for creating and sustaining a thriving academic environment in accordance with the Polytechnic and Community College Strategic Plan (2018-2025) (Stukalo & Lytvyn, 2021). UNESCO's 2018 directive emphasizes the integration of sustainable development principles into education, an imperative echoed by the DPCCE's commitment (Legusov et al., 2022). This dedication not only signifies a pursuit of academic excellence but also underscores a broader contribution to sustainable societal progress (Ahmad et al., 2023). In summary, the DPCCE's proactive measures position it to be a TVET leader, emphasizing sustainability in education and research for both immediate educational goals and broader societal advancement aligned with sustainable development principles (Nalathambi et al., 2023).

Polytechnics and community colleges have actively participated in championing and implementing sustainable development initiatives (Sulaiman et al., 2021). In response to the government's directive, Polytechnic Malaysia took a significant step in 2015 by formulating the POLYGreen Blueprint—the sole blueprint initiated by the Malaysian Ministry of Education at that juncture (Zublie et al., 2023a). Launched in April 2015, the POLYGreen Polytechnic Malaysia Blueprint 2015 (BPPM) serves as an operational framework for executing the sustainability agenda in Malaysian Polytechnics (Zublie et al., 2023b). Aligned with the National Green Technology Policy Goals (MDTHK) and the National Green Technology Policy (DTHN), this blueprint underscores a strategic plan for integrating sustainable practices (Essex et al., 2020). Subsequently, recognizing the evolving landscape and government policy objectives, the Blueprint SmartGreen Polytechnic Community College 2021-2026 (BSGPC) emerged in 2019 to perpetuate the sustainability agenda (Adi Badiozaman, 2021). Acknowledging the need for adjustments in line with government policy shifts, the Department of Polytechnic and Community College Education (JPPKK) is undertaking enhancements to the BPPM. This initiative aims to fortify the commitment to sustainability and ensure the continued success of polytechnics and community colleges in navigating the challenges of the contemporary era of globalization.

2. METHODOLOGY

The methodology employed in crafting this paper involves a combination of literature review and descriptive-explanatory analysis. The foundation of this research rests upon an extensive exploration of existing literature, facilitating a comprehensive understanding of the subject matter (Hamilton et al., 2021). This literature review serves as a basis for the subsequent descriptive-explanatory analysis, where the paper delves into the detailed examination and elucidation of key concepts and phenomena (Carbajo & Cabeza, 2022). The dual employment of these methodologies contributes to a robust exploration of the topic, ensuring a thorough synthesis of theoretical frameworks and empirical insights (Fan et al., 2022). This approach not only enhances the scholarly rigor of the paper but also enables a nuanced and insightful discussion, thereby enriching the academic discourse on the subject.

3. RESULTS AND DISCUSSION

3.1. Blueprint Smartgreen Policy

The inception of the Blueprint SmartGreen Polytechnic Community College 2021-2026 (BSGPC) in 2019 signifies a commitment to perpetuate the sustainable development agenda, aiming to bolster the standing of polytechnics and community colleges amidst the challenges posed by globalization (Chia et al., 2023). Crafted with the underlying rationale of serving as a comprehensive reference and guiding document, the BSGPC is intended to steer all polytechnics and community colleges towards sustainable management practices (Khalid et al., 2021). The blueprint is strategically designed to enhance and refine targets for sustainable project achievements, ultimately leading to the coveted recognition of Sustainable Campus status (Mansell et al., 2020). Moreover, BSGPC prioritizes the augmentation of innovation and creativity in sustainable development, envisioning a significant impact on economic, social, and environmental facets (Chagnon-Lessard et al., 2021). An integral facet of this initiative is the reinforcement of collaboration among institutions, stakeholders, society, and industry, with a dedicated consideration for inclusivity, including the disabled community (Ishak & Thiruchelvam, 2023). The BSGPC is meticulously crafted based on the Sustainable Development Goals (SDGs), encapsulated within seven distinct Focus Areas.

3. 1. 1. Focus Area 1: Management of Education and Research

According to Khatib et al. (2022), the concept of environment is mostly not mentioned explicitly in the content of a subject. As a result, the emphasis given by educators to environmental education varies in aspect, purpose, scope, direction and impact depending on the interests and efforts of an individual educator. This focus area is the best medium to spread the concept of sustainable development education (ESD) to polytechnics and community colleges in particular and to the general public (Albert & Uhlig, 2022). The comprehensiveness of this approach covers all aspects of educational operations, integrates diverse disciplinary domains, and extends its influence to the surrounding environment (Cebrián et al., 2020). Through BT-PPP within this BSGPC, various sustainability programs and projects at Polytechnics and Community Colleges can be coordinated so that they are more focused and high-impact based on the Malaysian Education Development Plan 2015 - 2025 (Higher Education) and support the Polytechnic and Community College Strategic Plan 2018 - 2025 Most of the environmental awareness programs today target awareness in environmental, economic, and social aspects towards a more sustainable life (Saari et al., 2021).

3. 1. 2. Focus Area 2: Energy Management and Climate Change

Malaysia grapples with surging energy demands, evidenced by the escalation of CO_2 emissions from 241.6 million tons in 2017 to 250.3 million tons in 2018 (Latif et al., 2021). Projections foresee a 4.3% surge in energy consumption by 2030. Addressing these challenges, policies such as the National Climate Change Policy 2009 (NPC), National Renewable Energy Action Plan (NREPAP), Renewable Energy Act 2011, and National Green Technology Policy (NGTP) aim to mitigate climate issues and foster sustainable development (Hasan et al., 2020). To combat the effects of climate change, polytechnics and community colleges must strategize efficient energy and greenhouse gas (GHG) emission management (Lee & Lee, 2022). Initiatives, including educational campaigns like Tenaga Nasional Berhad's energy efficiency program, disseminate knowledge on CO_2 reduction, fostering environmental sustainability awareness. Furthermore, adopting passive architecture emerges as a potential solution, curbing energy dependence and contributing to climate change mitigation.

3. 1. 3. Focus Area 3: Environment and Landscape Management

The National Physical Plan (NPN) places a significant emphasis on urban environments, directing attention to the planning and preservation of open spaces in Malaysia. This approach has witnessed a heightened engagement in landscape development, ensuring ample green spaces for recreational activities (Sonet et al., 2021). Involving active participation from users, local communities, and decision-makers, the landscape planning process advocates for a bottom-up development approach, promoting a more effective and efficient development trajectory. Implementing a sustainable landscape design master plan becomes instrumental in maintaining environmental aesthetics systematically, simplifying processes for institutions (Ibrahim et al., 2020). A well-designed environmental plan not only strengthens community-institution bonds but also mitigates social issues. Integrating environmental management practices into institutional operations through policies and procedures ensures the consistent application of best environmental practices (Hussein et al., 2020). Establishing clear guidelines for biodiversity and landscape management underscores the institution's commitment to environmental sustainability, with a parallel effort to raise local community awareness regarding environmental control and management. This multifaceted approach strives to create a safe, healthy, and aesthetically pleasing environment that preserves and conserves local biodiversity, aligning with the goals of inclusive economic growth (Irawan, 2023).

3. 1. 4. Focus Area 4: Waste Management

Due to escalating urbanization and population growth, Malaysia is anticipated to generate over 25,000 tons of household waste annually. According to MacAfee & Löhr (2023), the surge in unmanaged waste, encompassing stoves, organic materials, and inorganic components, poses a significant environmental challenge, emitting greenhouse gases (GHG). To counteract this, the Malaysian government has articulated strategies within its current plan to enhance the efficacy of solid waste management, aiming to reduce GHG emissions by 40% of the country's GDP by 2020 (Shakil et al., 2023). Initiatives include inorganic waste recycling, the establishment of material recovery facilities, and the implementation of heat treatment plants (Kamaruddin et al., 2017). The action plan involves the execution of a Recycling Program (Prevent, Reduce, Reuse, Recycle, Treat) and an initiative to minimize the usage of printed materials (N. I. Ramli et al., 2021).

Further measures include diminishing organic waste disposal in landfills through composting and addressing non-recyclable, non-organic waste. The plan also emphasizes the regulated management of toxic material waste and wastewater treatment (Lim et al., 2021). Alignment with eco-industry policies, green knowledge, and good manufacturing practices reinforces the commitment to sustainable waste management practices (Irawan et al., 2023).

3. 1. 5. Focus Area 5: Water Management

In the midst of Malaysia's rapid development, managing water demand emerges as a pivotal strategy to meet the escalating needs sustainably, considering the influence of climate change on water resources. Raising awareness among all water users regarding various water conservation techniques, including rainwater harvesting and recycling, becomes imperative (Mukarram et al., 2023). Encouraging such practices not only reduces reliance on treated water but also enhances the green building index, contributing to a more comprehensive and integrated water sector (Jnr, 2021). This approach aims at ensuring water security and sustainability in the face of increasing demand. The proposed action plan involves enhancing utility knowledge and promoting water-saving practices through campaigns, monitoring current water usage, and implementing water recycling systems like rainwater collection (Khadir et al., 2023). Moreover, policy integration linking water security and sustainability with the quality of green education and training, coupled with knowledge sharing on eco-friendly technology adoption, is crucial for sustainable practices, particularly within the agro-industry sector (Esthi et al., 2023).

3. 1. 6. Focus Area 6: Transportation Management

Addressing carbon reduction in the road transport sector is a crucial goal for Malaysia, aiming for an unconditional 45% reduction in carbon intensity across the entire economy by 2030, relative to GDP. In 2016, road transport emerged as the second-largest contributor to Malaysia's total carbon dioxide emissions, constituting 21% of the national output (Awan et al., 2022). The Malaysian government grapples with the challenge of transforming the Public Transport System (PTS) to make public transportation the preferred choice for Malaysians (Ramli et al., 2023). The action plan involves creating awareness about pollution reduction in the transportation sector through policy implementation and green technology adoption (Shah et al., 2021). Initiatives include promoting vehicle sharing, encouraging the use of public transport among polytechnic residents, providing guidelines for pedestrian and bicycle use, and implementing a vehicle use policy aimed at reducing carbon emissions (Kuys et al., 2022). These efforts signify a concerted attempt to reshape public perception and promote sustainable practices, aligning with broader environmental conservation objectives.

3. 1. 7. Focus Area 7: Green Procurement

According to Ishak and Thiruchelvam (2023), the integration of green procurement within the Malaysian Government's MyHijau initiative stands as a pivotal strategy for fostering a transformative shift towards sustainability. Initially emphasized in the 11th Malaysia Plan (2016-2020), the Construction Industry Transformation Plan (CITP) 2016-2020, and the National Construction Policy 2030 (NCP2030) under the Malaysian Ministry of Public Works, green procurement is dedicated to promoting sustainability and community resilience. Its implementation in polytechnic and community college systems involves supporting environmental preservation and reducing carbon footprint (Zainudin et al., 2021). This is achieved through various initiatives, including supplier and supply chain

training and briefings, the implementation of Train the Trainers (TOT), annual green procurement planning, and the preparation of performance reports. These endeavors underscore a concerted effort to instill environmentally conscious practices within the procurement processes, aligning educational institutions with broader sustainability goals (Kiplimo et al., 2020).

3.2. SmartGreen PolyCC Blueprint Focus Areas (BSGPC) Assessment

The emphasis areas have been harmonized with the assessment criteria outlined by the UI Green Metric World University Ranking, GMP, and four (4) campus management excellence. The SmartGreen PolyCC Judging Categories, overseen by the Department of Polytechnic and Community College Education (DPCCE), encompass green campus, green community cultivation, green research, and green culture (Yadegaridehkordi & Nilashi, 2022). The measurement of the Blueprint SmartGreen Polytechnic Community College 2021-2026 (BSGPC) success is gauged through the accomplishments in these specific categories. In order to ensure the holistic contribution of polytechnics and community colleges to the advancement of green initiatives, a comprehensive evaluation framework is provided by the judging criteria. These criteria align with recognized benchmarks in sustainability, allowing effective assessment of the effectiveness and impact of BSGPC implementation (Mustaffa et al., 2021).

3.3. Polytechnic Sustainable Achievements

The primary function of the Department of Polytechnic and Community College Education (DPCCE) revolves around the execution of short-, medium, and long-term plans guided by the Blueprint SmartGreen Polytechnic Community College 2021-2026 (BSGPC). These plans aim to facilitate the integration of sustainable development practices, fostering a platform for knowledge exchange and experience-sharing in the application of green technology (Chia et al., 2023). Additionally, DPCCE focuses on cultivating innovative human capital by generating products rooted in green technology. The department actively forges collaborations with the Ministry, public and private sectors, and industry players, fostering expertise and knowledge sharing. Notably, a dedicated BSGPC committee has been established to formulate policies and strategies that encourage the adoption of green technology practices. Within the academic realm, the Curriculum Division under DPCCE has successfully incorporated green technology into program curricula, emphasizing a holistic approach to sustainability education (Jnr, 2021).

3. 3. 1. Application of Green Elements into the Curriculum for the Polytechnic Study Program

A green curriculum in the framework of greening TVET at the institutional level becomes a holistic framework that is much needed to transform TVET institutions as a whole designed to meet the future skills for clean and green jobs required by the global workforce and properly conserve resources (Mustapha & Hussain, 2022). According to Komuniti (2020), a workshop to produce a POLYGreen Master Trainer with a total of 66 officers from 33 polytechnics have been appointed as master trainers and coordinators implementing the green technology program at the polytechnics. The green curriculum has begun to be used for the June 2019 session, and the aim is for the graduates to know the SDGs, which include the socio, economic and environmental (Kanapathy et al., 2020). Professional/Industry Certification: The Z050 Green Compliance Officer Course has been commissioned with a professional certification from the Skills Development Department, which is the first recognition of the certification sustainable professional Polytechnic Malaysia.

3. 3. 2. Energy Consumption Malaysia Polytechnic

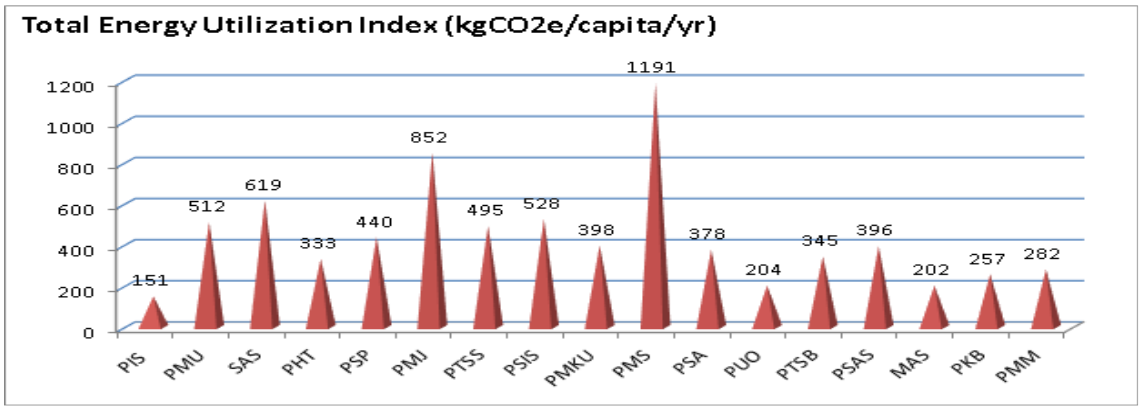

Figure 1. Carbon Footprint Of Polytechnic Malaysia 2014 - 2015 (Baseline year 2014)
Source: (Komuniti, 2020)

Figure 1 illustrates the Carbon Footprint of Polytechnic Malaysia for the years 2014-2015, with 2014 serving as the baseline year. The carbon footprint analysis conducted at the polytechnic encompasses emissions from sources either owned or directly controlled by the institution (Jnr, 2021). Furthermore, it accounts for both indirect emissions stemming from electricity consumption and other indirect emissions, all in accordance with the guidelines outlined in The Greenhouse Gas Protocol (GHG Protocol). The emissions are quantified in terms of carbon dioxide (CO_2), methane (CH), and nitrous oxide (NO), expressed collectively as kilograms of CO_2-equivalents ($kgCO_2$-eq). This comprehensive approach to carbon footprint assessment enables a thorough examination of the polytechnic's environmental impact, considering both direct and indirect sources. The breakdown of emissions into specific greenhouse gases provides valuable insights into the institution's contribution to climate change (Su et al., 2023). Understanding and mitigating these emissions are crucial steps for Polytechnic Malaysia to align with sustainability objectives and foster eco-friendly practices within the academic and operational spheres.

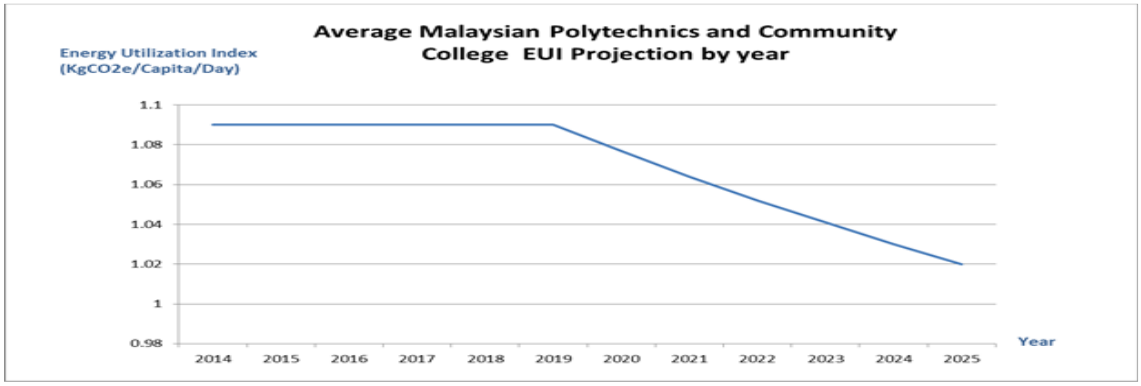

Figure 2. Energy Utilization of Polytechnic Malaysia Projection by Year
Source: (Komuniti, 2020)

Illustrated in **Figure 2** is the Energy Utilization Index (EUI) specific to Malaysian Polytechnics, a metric derived from the energy consumed per population per day. EUI is computed by dividing the total energy consumption of a building over a year by the building's total population and further dividing the result by 365 (Dahlan et al., 2022). This index serves as a crucial indicator of energy efficiency, with lower EUI values signifying superior energy performance for each polytechnic. The utilization of EUI in this context

allows for a comparative analysis of the energy efficiency of different polytechnic buildings. Essentially, a lower EUI is indicative of more effective energy management, aligning with sustainability goals and reflecting a commitment to optimizing energy consumption (Aldhshan et al., 2021). This approach aids in fostering awareness and promoting practices that lead to improved energy performance across Malaysian Polytechnics, contributing to broader initiatives for environmental conservation and sustainable development.

3.4. UI GreenMetric World

Table 1 shows Polytechnic Malaysia's achievement in the UI GreenMetric World University Ranking from 2018b-2022. UI GreenMetric World University Ranking is an evaluation system that is a commitment to the preservation of campuses and the environment undertaken by campuses of higher education institutions around the world. It has been inspired and managed by Universitas Indonesia (UI) since 2010. The UI Green Metric World University Ranking is based on Sustainable Development, which is a balance between economic development, social stability and environmental conservation (Suwartha & Berawi, 2019).

Table 1. Polytechnic Malaysia's achievement in UI GreenMetric World University Ranking

Polytechnic	2018		2019		2020		2021		2022	
Merlimau Polytechnic	335	11	275	11	254	12	246	14	332	15
Mersing Polytechnic	634	17	533	18	573	20	528	22	445	21
Sultan Idris Shah Polytechnic							644	24	484	22
Seberang Perai Polytechnic									551	24
Mukah Polytechnic									595	25
Kuching Sarawak Polytechnic							721	25	612	26
Banting Polytechnic							888	28	819	30
Nilai Polytechnic							886	27	965	32

Source: https://greenmetric.ui.ac.id/rankings/overall-rankings

3.5. Sustainable Institution Award

The SmartGreen Award established by PolyCC aims to acknowledge institutions that have actively contributed to sustainable development, fostering the creation of environmentally conscious campuses through diverse projects and activities rooted in green technology and sustainability (Suswadi et al., 2023). This prestigious recognition is bestowed upon institutions based on various categories. In delineating the significance of the SmartGreen Award, it becomes evident that it serves as a commendation for institutions within the Malaysian Polytechnic and Community College network that have demonstrated notable commitment and impact in advancing sustainable practices (Ilham et al., 2020). The recognition is grounded in the implementation of projects and activities centered around green technology, solidifying the institution's dedication to sustainability. The award is thoughtfully categorized to encompass different aspects, providing a comprehensive evaluation of an institution's multifaceted contributions to creating a sustainable campus.

3. 5. 1. Malaysia GPM Sustainability Award (GPM Awards)

The GPM Award is aligned to support the 17 Sustainable Development Goals (SDGs) of the United Nations. This award aims to recognize individuals, institutions, and organizations that have contributed to various sustainability projects to achieve the country's sustainable development goals. This recognition is supervised and evaluated by the Sustainable Business Network Association Malaysia (SustNET), Malaysian Chapter based on the following three categories: best project award, sustainability award and Foundation award (Wan & Abdullah, 2021).

3. 5. 2. BluePrint SmartGreen PolyCC Award (MPCCSustAward)

The execution of Seven Focus Area initiatives necessitates a synchronized and comprehensive approach (Faizuddin et al., 2022). The objective is to acknowledge and highlight the accomplishments and impacts of individuals and sustainable development projects achieved through the application of efficient, sustainable project management practices (Chow et al., 2021). This initiative is collaboratively organized by the Curriculum Division (specifically the Agricultural Technology Unit) of the Department of Polytechnic and Community College Education (DPCCE) and Polytechnic, represented by the SmartGreen PolyCC Committee. The primary aim is to advocate for sustainable Technical and Vocational Education and Training (TVET) campus institutions, both within Malaysia and internationally. This advocacy is slated to culminate in the upcoming International Webinar & Showcase on Malaysian Sustainability Projects (Marcum-Dietrich et al., 2021).

4. CONCLUSION

In conclusion, the journey towards establishing polytechnics and community colleges since 2010 has witnessed proactive measures aimed at integrating sustainability into their core activities. The implementation of workshops to cultivate POLYGreen Master Trainers stands out as a pivotal initiative, with 66 officers from 33 polytechnics appointed to spearhead the green technology program. A systematic approach to carbon emissions monitoring is actively pursued across all polytechnics, complemented by the commitment to biannual carbon footprint reporting for thorough analysis. In order to foster sustainability awareness, the Blueprint SmartGreen Polytechnic Community College 2021-2026 (BSGPC) has seamlessly integrated elements of sustainable development into all institutional activities. The incorporation of a green curriculum since June 2019 underscores the institution's dedication to equipping graduates with knowledge encompassing socio-economic and environmental dimensions, particularly aligned with the Sustainable Development Goals (SDGs). This curriculum adjustment aims to produce graduates well-versed in current needs and conscientious in resource utilization to safeguard the needs of future generations. The institutional commitment extends beyond national borders, with an evaluation through the UI Greenmetric World University Ranking reflecting the aspiration for polytechnics and community colleges to emerge as prominent players in the global sustainability agenda.

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