Role of University Campus in Driving Sustainability in Southeast Asia: A systematic content analysis

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Abstract

For the past two decades, the strategic role of universities in driving sustainability in Southeast Asia has been neglected. This paper fills the research gap by exploring the role of university campuses in promoting sustainability. Through a systematic content analysis of 52 articles, the study examines the focus areas of sustainability efforts on campuses. The findings highlight the primary focus on environment and social development (46%), followed by building and layout administrative and governance, and quality of service (40%). However, there is limited literature on inclusivity (8%), transportation, and mobility (6%) in relation to sustainability.

Keywords: Campus planning and design; Sustainability; South-East Asia; Content analysis

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1.0 Introduction

Southeast Asia has emerged as a beacon of promise in the global economy, as numerous countries within the region have become influential players (OECD, 2018). In order to sustain this upward trajectory, it is imperative to prioritize the pursuit of high-quality education to cultivate skilled and capable workforce that can drive economic growth and sustainable development (United Nations, 2020). Therefore, it is crucial to invest in higher education and foster the creation of university campuses that embrace the principles of sustainability, ensuring that the region continues to flourish on the global stage (Bong & Premaratne, 2018).

While the university campus settings plays a vital role in moulding the overall student journey, empowering academic achievements, and fostering well-being (Grocer et al., 2018), the role of a university campus in driving sustainability extends beyond its physical presence. It encompasses various aspects that contribute to creating a sustainable environment and promoting sustainable practices among students, faculty, staff, and the wider community especially in Southeast Asia region (Mansor et al., 2023). In today's landscape, universities have a multitude of opportunities to actively contribute to and engage with their cities on various levels. These opportunities arise from the evolving role of higher education institutions, which now serve as key drivers in leveraging knowledge and fostering innovation within local communities (Mohammed et al., 2022).

Furthermore, the magnitude of universities' impact on driving sustainability has necessitated a shift in their strategies and solutions to effectively address future needs (Tahir et al., 2021). The dynamic relationship between universities and the mission of sustainable development presents both opportunities and challenges that require sustainable handling to maximize its potential. Over the years, researchers have devoted their attention to exploring these opportunities and challenges in the context of the campus's role in driving sustainable development. However, there are certain aspects of this relationship that remain undiscovered in Southeast Asian countries. Hence, this review focuses on selected research articles to address two key research questions:

(1) What are the various topics related to university/campus sustainability that have been discussed in previous research, and which areas have received moderate examination?

(2) To what extent can universities benefit and drive sustainability in Southeast Asia?

By exploring this topic, this study aims to shed light on the existing research gaps while reaching into the depth and complexity associated with the role of university campuses on driving sustainability.

2.0 Methodology

A systematic literature review is a rigorous method that synthesizes existing knowledge, identifies research gaps, and informs decision-making (Samsuddin et al., 2020). This method is adopted to acquire relevant articles pertaining to the topic.

2.1 Review Protocol – ROSES

The study followed the Reporting Standards for Systematic Evidence Syntheses (ROSES) review protocol, which is designed for systematic reviews in the environment management field. ROSES emphasizes providing the right information with appropriate detail (Gusenbauer & Haddaway, 2019). The protocol starts when authors formulated research questions and explained the systematic searching strategy (identification, screening, and eligibility), and appraised article quality. They then described the data abstraction process, analysis, and validation (Shaffril et al., 2019).

2.2 Systematic Review Process

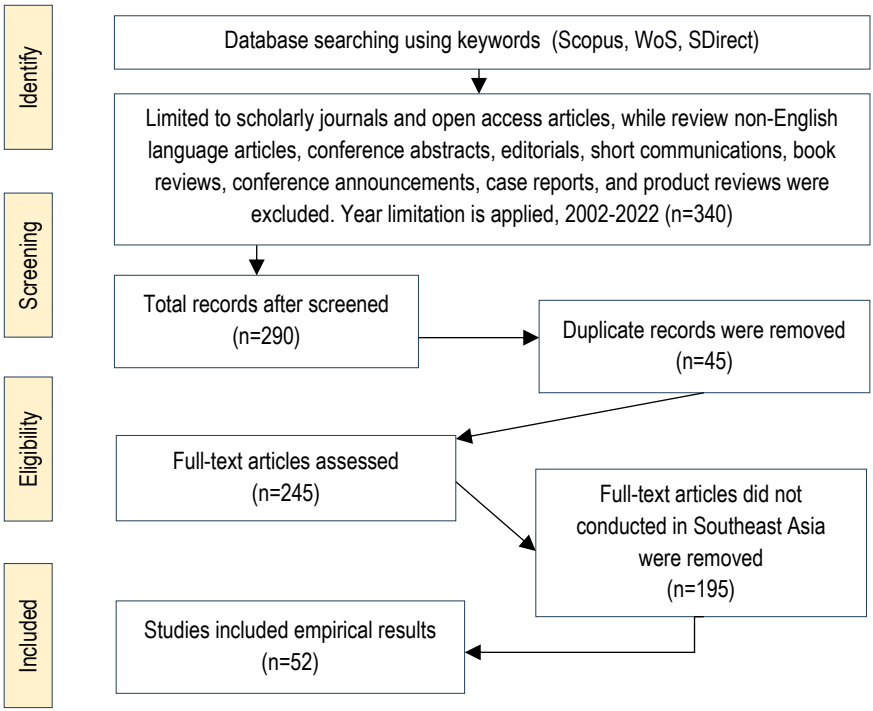

Figure 1: The flow diagram of the study
(Source: Shaffril et al., 2019)

The systematic searching strategy involves three key processes: identification, screening, and eligibility, as illustrated in Figure 2. To start, this study conducted search string (refer to Table 1) using specific keyword search terms, including terms like “campus”, “university”, and “colleges”, along with relevant terms such as “planning and design”, “guidelines”, and

"policy". These search terms were used to retrieve relevant articles from academic databases such as ScienceDirect, Web of Science, and Scopus.

The inclusion criteria were limited to scholarly journals and open access articles, while review articles, conference abstracts, editorials, short communications, book reviews, conference announcements, case reports, and product reviews were excluded. Duplicate articles were removed, and a date filter ranging from 2002 to 2022, covering a twenty-year period, was applied and this resulted to n=245 articles acquired from all three databases.

The eligibility stage, which is the third process, involved the authors manually reviewing the retrieved articles to ensure that the remaining articles (after the screening process) aligned with the predefined criteria (Shaffril et al., 2019). To maintain the focus on studies conducted in the Southeast Asia region, the titles and abstracts of the articles were methodically examined during this process.

Table 1: Search string applied to this study.

Database	Search String
Scopus	TITLE-ABS-KEY (("Campus" OR "University" OR "Colleges" OR "Higher Education" OR "Institutions" OR "Educational Space") AND ("Planning" OR "Design" OR "Framework" OR "Model" OR "Space" OR "Environment") AND ("Southeast*Asia" OR "SEA"))
Web of Science	TS= (("Campus" OR "University" OR "Colleges" OR "Higher Education" OR "Institutions" OR "Educational Space") AND ("Planning" OR "Design" OR "Framework" OR "Model" OR "Space" OR "Environment") AND ("Southeast*Asia" OR "SEA"))
ScienceDirect	TITLE-ABS-KEY (("Campus" OR "University" OR "Colleges" OR "Higher Education" OR "Institutions" OR "Educational Space") AND ("Planning" OR "Design" OR "Framework" OR "Model" OR "Space" OR "Environment") AND ("Southeast*Asia" OR "SEA"))

(Source: Author)

3.0 Results and Discussion

The collected articles extensively cover 6 distinct aspects of campus planning and design, which significantly influence the role of university campuses in driving sustainability. These aspects encompass buildings and layout, environmental and social development, administration and governance, transportation and mobility, as well as inclusivity and quality of services. The categorization of these aspects was derived from the interpretations of definitions presented in the selected articles as shown in Table 2. Several studies emphasize the importance of recognizing the pivotal role of university campuses in promoting sustainable development in the Southeast Asia region. Conversely, other studies shed light on the challenges faced in establishing sustainability initiatives, particularly in geographically constrained countries. This section examines these 6 aspects of campus planning and design, presenting their interconnectedness with sustainability through a thorough review of existing literature by previous researchers. The results of the 52 articles examined show that the environment and social development are the key focal areas (46%), followed by building and layout, administrative and governance, and service quality

(40%). Inclusion (8%), transit and mobility (6%), on the other hand, receive less emphasis in the research.

Table 2: Studies perspective and lesson for role of university campus in driving sustainability

Aspects of Campus Planning and Design	Sustainability Perspective and Lesson	Implication	Number of References
Buildings and Layout	A nurturing, effective, safe, and secure environment with interactive learning and social spaces is essential to facilitate daily activities effectively within the university community.	It fosters a sense of community, encourages social interaction, and provides a platform for collective action towards sustainable practices.	Abd-Razak et al. (2011), Ramadhan et al. (2021), Tao et al. (2019), Abdullah et al. (2011), Han et al. (2013), Hashim & Denan (2015), Kahl (2014),
Environment and Social Development	Incorporating nature-based solutions and strategies, not only improves university operations but also ensures the preservation of ecological significance. Moreover, it creates valuable opportunities to enhance the physical and emotional well-being of both students and staff members.	Empowering university and students to actively engage in initiatives addressing environmental and social issues. This drives positive change and nurtures a campus culture that values sustainability and social responsibility.	Aruninta et al. (2018), Orbon et al. (2018), Zaki et al. (2020), Putri et al. (2020), Wattanapisit et al. (2016), Amin et al. (2014), Ibrahim & Fadzil, (2013), Sufar et al. (2010), Lavista et al. (2015), Susilowati et al. (2021), Applasamy et al. (2014), Din et al., (2015), Ramu et al. (2020), Sedaghatnia et al. (2015), Yusof et al. (2016), Abdullah & Yusof, (2012), Supriyadi R. (2012), Yusof & Fajri (2022), Budihardjo et al. (2021), Derahim et al. (2011), Fatriansyah et al. (2021), Hooi et al. (2012), Ishak et al. (2012, Khalil et al. (2011), Hirunsalee et al. (2013)
Administration and Governance	Effective decision-making plays a crucial role in shaping globalization strategies, fostering collaborative partnerships to develop solutions, and strengthening the relationship between the campus and the city.	Facilitating collaboration for innovative solutions and strengthening the campus-city relationship, resulting in a globally connected university with sustainable growth.	Xavier & Alsagoff (2013), Mehta et al. (2017), Ngo & Trinh (2016), Prafitasiswi et al. (2022), Tahir et al. (2021), Khalil et al. (2014), Mustapha et al. (2021)

Transportation and Mobility	Significant implications for sustainability, as they directly influence transportation choices. The environmental, social, and economic impacts of pollution and energy waste are far-reaching with negative impacts.	Shaping transportation choices and exerting environmental, social, and economic impacts, emphasizing the urgent need for responsible and eco-friendly mobility practices.	Setiawan et al. (2015), Jalalkamali & Ghraei (2012), Chen et al. (2021)
Inclusivity	Equal access for students and staff members by implementing universal design principles and promoting accessibility to technology, creating an inclusive a environment.	Fosters inclusivity by implementing universal design principles and promoting technology accessibility, fostering an environment that values diversity and empowers every individual.	Osman et al. (2014), Zaki & Ismail (2021), Im et al. (2022), Nguyen et al. (2022)
Quality of Services	High-performing services has a direct impact on the satisfaction levels of students and staff members, which, in turn, influences both retention rates and the attraction of prospective individuals.	By fostering a sense of belonging and motivation, these services contribute to a positive university experience.	Giantari et al. (2022), Ramsbotham et al. (2019), Muslim et al. (2012), Hashim et al. (2013), Muwardi & Dewancker (2017), Yuserrie et al. (2015), Applasamy et al. (2014)

(Source: Author)

3.1 Environmental and Social Development

As most of the literature pertaining to campus planning and design mostly being studied in the Western countries, there is a significant gap when implementing the same strategies into Southeast Asia region. As highlighted by previous studies, when comparing Western campuses to Southeast Asian campuses, the incorporation of nature-based solutions in the development of strategies may vary due to several factors, including microclimate and cultural norms. In contrast, previous study by (Aruninta et al., 2018) shows that, Southeast Asian campuses face different challenges due to the tropical climate characterized by high temperatures, humidity, and heavy rainfall. Here, nature-based solutions may emphasize the use of shade-providing trees, natural ventilation techniques, and water management systems designed to handle intense rain events and prevent flooding (Orbon et al., 2018). These solutions take into account the unique microclimate factors of the region and aim to create comfortable outdoor spaces that are adapted to the local weather conditions as noted by other studies as well (Zaki et al., 2020). Moreover, cultural norms play a significant

role in shaping the implementation of nature-based solutions on campuses. Southeast Asian cultures often have a deep connection with nature and a tradition of incorporating green spaces within their communities (Hashim & Denan, 2015). This cultural affinity towards nature can serve as a strong driver for integrating nature-based solutions into campus development plans. It may involve the preservation of existing natural features, incorporating traditional design elements that harmonize with the surroundings, and creating spaces that facilitate social and cultural activities in an outdoor setting (Putri et al., 2020).

Beyond the operational and ecological benefits, incorporating nature-based solutions in university campuses can enhance the well-being of students and staff as highlighted by (Lavista et al., 2015). Access to green spaces, natural views, and outdoor recreational areas has been associated with improved mental health, reduced stress levels, and increased productivity (Susilowati et al., 2021). Creating vibrant and sustainable campus environments that prioritize the integration of nature can contribute to a positive and inclusive university experience for all members of the community, fostering a sense of connection and well-being. According to Ramu et al., (2020), cultural attitudes towards nature and sustainability can influence the acceptance and adoption of nature-based solutions. While Western societies have witnessed a growing environmental consciousness and emphasis on sustainability, Southeast Asian cultures have long-standing traditions of living harmoniously with nature. This cultural perspective can foster a deeper appreciation for nature-based solutions and support their integration into the campus environment (Ramu et al., 2020). It can also inspire innovative approaches that blend traditional design principles with modern sustainability practices, creating campuses that reflect both local cultural heritage and environmental stewardship (Sedaghatnia et al., 2015).

3.2 Buildings and Layout

Creating a nurturing, effective, safe, and secure environment with interactive learning and social spaces is crucial for enabling the smooth functioning of daily activities within the university community (Abd-Razak et al., 2011). Such an environment plays a pivotal role in fostering a conducive atmosphere for learning, collaboration, and personal growth. By providing well-designed and functional spaces, universities can facilitate efficient academic pursuits, encourage meaningful interactions between students and faculty, and support the overall well-being of individuals within the campus (Tao et al., 2019). Previous studies found that an effective learning environment involves providing classrooms, libraries, and study areas that are equipped with the necessary resources and technologies to enhance the educational experience (Han et al., 2013). These spaces should be designed to promote engagement, concentration, and knowledge exchange among students and teachers. Therefore, interactive learning spaces, such as collaborative work areas and innovative labs, can foster active participation, teamwork, and experiential learning (Kahl, 2014).

However, the campus should prioritize safety and security measures to ensure the well-being of its occupants. This includes implementing security protocols, surveillance systems, and emergency response mechanisms to address any potential risks or threats as

highlighted in studies conducted by (Putri et al., 2020). By creating a secure environment, universities instil a sense of trust and confidence among the members of the community, allowing them to focus on their academic and social endeavours without undue concerns (Amin et al., 2014). Furthermore, promoting socialization, community building, and personal development, social areas within the campus are crucial in addition to academic spaces. These areas encompass student lounges, recreational facilities, cafeterias, and outdoor gathering spots (Ibrahim & Fadzil, 2013). However, previous studies indicate a limited focus on the notion of social areas and spaces within Southeast Asian university campuses compared to their Western counterparts (Rambostham et al., 2019). This disparity suggests an understudied aspect, potentially influenced by the diverse cultural backgrounds present in Southeast Asia, leading to a lack of understanding and exploration of the multifaceted complexities involved.

3.3 Administration and Governance

Administration and governance play a critical role in driving the campus as a key player in promoting sustainability. Effective decision-making processes within the university's administrative structure are essential for implementing sustainable practices and shaping globalization strategies (Abdullah & Yusof, 2012). The administration sets the vision and goals for the campus, defining its commitment to sustainability and establishing policies and initiatives to support this agenda. By integrating sustainability principles into the campus's strategic plans and institutional frameworks, the administration sends a strong message to the entire university community about the importance of sustainability (Yusof & Fajri, 2020). Furthermore, effective administration and governance enable the campus to foster collaborative partnerships with various stakeholders, both within and outside the university (Tahir et al., 2021). Collaborations with local government bodies, businesses, non-profit organizations, and community groups can lead to the development of innovative solutions and initiatives that address sustainability challenges on a broader scale (Budihardjo et al., 2021). By forging these partnerships, the campus can leverage resources, expertise, and networks to implement sustainable practices and create a positive impact beyond its boundaries.

In addition, the relationship between the campus and the surrounding city or community is vital in driving sustainability (Mohammed et al., 2022). The administration plays a crucial role in strengthening this relationship by actively engaging with local authorities, community organizations, and residents. Through dialogue, joint planning, and shared decision-making processes, the campus can contribute to sustainable urban development, addressing common challenges such as transportation, waste management, and energy efficiency (Fatriansyah et al., 2021). A study conducted by Mohammed et al., (2020), found that this collaborative approach creates a mutually beneficial relationship where the campus benefits from the city's infrastructure and resources, while also actively contributing to the city's sustainability goals. Effective administration and governance also involve establishing mechanisms for monitoring and evaluating sustainability efforts. By setting measurable targets, tracking progress, and regularly reporting on sustainability performance, the

administration ensures accountability and transparency (Mohammed et al., 2022). This allows the university community and external stakeholders to assess the campus's sustainability initiatives, identify areas for improvement, and celebrate successes.

3.4 Quality of Services

The quality of services in campus buildings, transportation, and accommodation is crucial for supporting sustainability (Giantari et al,. 2022). Sustainable buildings with energy-efficient systems and smart technologies reduce energy consumption and minimize the carbon footprint. Similarly, a study by Yuserrie et al., (2015), found that reliable and eco-friendly transportation options, such as public transportation, bike-sharing programs, and carpooling initiatives, reduce reliance on private vehicles, decrease congestion, and lower emissions. Providing efficient and high-performing services directly impacts the satisfaction of students and staff (Ramsbotham et al., 2019). When their needs are met, they are more likely to be satisfied with their educational experience and remain engaged within the campus community. This contributes to retention rates and attracts prospective individuals seeking a high-quality and sustainable environment (Prafitasiswi et al., 2022). By prioritizing the quality of services, campuses foster a culture of sustainability. Sustainable practices in buildings, transportation, and accommodation not only reduce energy consumption but also promote sustainable travel behaviours and create eco-friendly living environments (Tahir et al., 2021).

3.5 Inclusivity

In the context of fulfilling the needs of 21st-century campuses, ensuring equal access and promoting inclusivity have become fundamental considerations. This topic has evolved and gained increasing demand in line with global efforts, particularly the Sustainable Development Goals (SDGs), which emphasize the importance of inclusive education and equal opportunities for all (Mansor et al., 2023). Universities are recognizing the significance of implementing universal design principles in their campus planning and design. Universal design aims to create environments that are accessible and usable by individuals with diverse abilities and backgrounds (Osman et al., 2014). By incorporating features such as ramps, elevators, wheelchair-accessible facilities, and clear signage, campuses can remove physical barriers and ensure that students and staff members with disabilities can navigate the campus independently.

Moreover, as noted in recent study by Zaki & Ismail (2021), promoting accessibility to technology is another crucial aspect of creating an inclusive educational environment. This includes providing assistive technologies, such as screen readers, captioning services, and adjustable desks, to support individuals with disabilities. Additionally, ensuring that digital platforms and online resources are designed with accessibility in mind allows all students to fully engage with educational materials and participate in virtual learning environments (Zaki & Ismail, 2021). Southeast Asia, with its rich cultural diversity and varying socio-economic backgrounds, can particularly benefit from adapting this topic in campus planning and design. By implementing universal design principles and promoting accessibility,

universities in Southeast Asia can create an inclusive and equitable educational environment that caters to the needs of students and staff members from diverse backgrounds (Mansor et al., 2023).

3.6 Transportation and Mobility

Travel behaviours have a significant impact on sustainability, as they directly affect transportation choices and subsequently contribute to environmental, social, and economic implications (Chen et al., 2021). According to Chen et al., (2021)., the negative consequences of pollution and energy waste resulting from transportation can be extensive and far-reaching. One key aspect to consider is the impact of long commutes on students' physical and emotional well-being. Lengthy and exhausting journeys to and from the university can lead to fatigue, stress, and decreased productivity among students. (Jalalkamali & Ghraei, 2021). The physical strain of commuting for extended periods can take a toll on their overall health. Moreover, the emotional drain caused by long commutes can negatively affect their motivation, engagement, and sense of belonging within the university community. To address these challenges and promote sustainable transportation, universities can adopt a variety of measures that provide users with alternative transportation options (Chen et al., 2021). A crucial step is to develop and improve public transportation systems connecting the campus with surrounding areas. This can include establishing partnerships with local transport authorities to enhance bus routes, frequency, and accessibility, ensuring convenient and reliable transportation for students, staff, and faculty.

Additionally, following a study by Setiawan et al., (2015) in Indonesia, it was found that universities can encourage active transportation modes, such as walking and cycling, by providing well-designed infrastructure, such as bike lanes, pedestrian-friendly paths, and secure bicycle parking facilities. Promoting active transportation not only reduces carbon emissions and energy consumption but also contributes to the physical well-being of individuals by promoting exercise and a healthier lifestyle (Setiawan et al., 2015). Moreover, carpooling and ridesharing programs can be implemented to reduce the number of single-occupancy vehicles on the road. Universities can facilitate carpool matching services, incentivize carpooling through preferential parking, and provide designated carpool lanes to promote this sustainable transportation option (Jalalkamali & Ghraei, 2012).

4.0 Campus as a Catalyst for Sustainability

As previously discussed, the role of the campus in driving sustainability encompasses various forms of engagement, cooperation, and partnership aimed at achieving sustainable outcomes. Previous studies suggests that the campus plays a pivotal and significant role in advancing sustainability, benefiting both the university and the broader sustainability agenda. It is crucial to recognize and prioritize the diverse facets of the campus's role in driving sustainability, as they cannot be overlooked or underestimated. Table 2 presents a summary of various viewpoints and lessons gathered from the literature, aiming to establish

a stronger and resilient bond between the university campus and global sustainability objectives. The previous literature review encompassed 6 aspects that focused on different facets of campus planning and design. Although previous studies have primarily examined the physical aspects of the campus environment or subjective factors to achieve a balanced relationship between the psychological and emotional well-being of the campus community. However, this approach can lead to a delicate disconnect between the campus environment and the community's needs in terms of physical and emotional well-being.

Figure 2 illustrates the distribution of articles across different aspects of campus planning and design, emphasizing their relevance in fostering sustainability agendas and enhancing the environment, economy, and social development. This mutually beneficial relationship applies to both students and universities. Most of the reviewed articles have predominantly evaluated the connection between campus planning and design and sustainability from a physical perspective. However, less attention has been given to the subjective dimension of this relationship. While the physical and subjective aspects are interconnected, individual articles have focused on assessing either physical parameters, subjective parameters, or both. For instance, some articles have employed quantitative methodologies, examining the correlation between outdoor spaces and student satisfaction using descriptive statistics and significance tests. These methodologies concentrate on the physical elements of outdoor spaces without considering their implications for student activities. On the other hand, certain research articles have adopted subjective parameters through observations and fieldwork, overlooking the preferences of the campus community. Thus, this study sheds light on less-explored aspects of campus planning and design and their role in driving sustainability within a broader context. By adopting this comprehensive approach, it provides a more refined perspective on how the university campus interrelates and overlaps with fostering sustainable relationships across environmental, economic, and social dimensions in Southeast Asia.

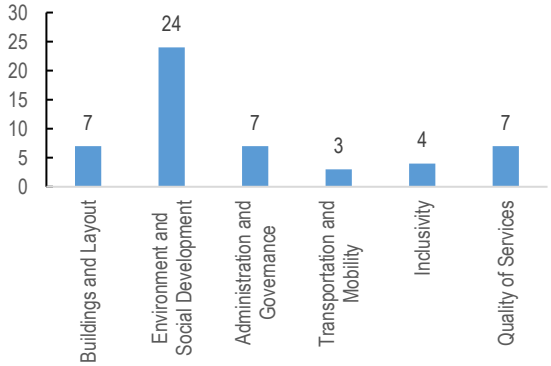

Figure 2: The number of articles belonging to different aspects of campus planning and design in Southeast Asia (n=52).
(Source: Authors)

5.0 Conclusions and Recommendations

In conclusion, the review of literature emphasizes the need to integrate both physical and subjective aspects of campus planning and design to foster sustainability. Previous research has primarily focused on either the physical parameters such as buildings and layout or transportation and mobility or subjective parameters such as environment and and social development, administration and governance, inclusivity and quality of services. To this which lacking integration between the two dimensions. To advance the field and develop a comprehensive framework for campus planning and design in the 21st century, future research should bridge this gap. This involves integrating the physical and subjective parameters, understanding their interdependencies and influences on the campus community. A multi-dimensional approach considering environmental, economic, and social factors is crucial. The framework should encompass variables such as green spaces, energy efficiency, well-being, satisfaction, community engagement, and contextual factors. By incorporating these variables, the framework can guide sustainable campus development and support decision-making. Future studies adopting these recommendations will contribute to creating inclusive and sustainable environments that align with global sustainability goals and meet the evolving needs of university communities.

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Article Contribution to Related Field of Study

This study makes a valuable contribution to the field by examining how campus planning and design can drive sustainability in the 21st century. It provides a comprehensive analysis of the physical and subjective parameters involved in establishing a balanced relationship between the campus environment and the well-being of its community. The study emphasizes the mutual benefits that sustainable campus planning and design bring to students and universities, underscoring the importance of integrating sustainability considerations to improve the environment, economy, and social development. By exploring the interplay between these factors, the study offers valuable insights for policymakers, planners, and designers. It acknowledges the necessity of adopting a holistic approach to campus planning and design that encompasses both physical elements like outdoor spaces and infrastructure, as well as subjective elements like user preferences and activities.

Authors Declaration

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