

## TOWARDS A SUSTAINABLE CAMPUS LANDSCAPE IN VIETNAM: A SYSTEMATIC REVIEW OF THE LITERATURE

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<https://doi.org/10.55250/jo.vnuf.2023.15.038-049>

### ABSTRACT

Higher education institutions in different countries around the world have adopted a variety of sustainability strategies in their policies, management, and scholarly activities. However, the campus landscape has not been explored to promote sustainability. To address this gap, this paper provides a systematic and comprehensive review of the literature on the sustainable campus landscape. The various aspects outlined in this research can be used as a reference for building a sustainable campus landscape for higher education institutions in Vietnam. The results of the study indicate that a sustainable campus landscape must be expressed through five aspects including (1) Enhancing ecological functions in urban areas, (2) Promoting sustainability of landscape and habitats, (3) Supporting the educational and experiential activities, (4) Enhancing physical and mental health for people, (5) Preserving and promoting historical cultural values. As a case study, Vietnam needs a change in cognition to foster innovation toward building a more sustainable campus landscape in higher education institutions in the future. Approaches are suitable for Vietnam include (1) Taking educational goals as a premise, (2) Taking people as the center, (3) Taking sustainable ecology as the foundation, (4) Taking science and technology as the mainstay, (5) Taking culture, history, and aesthetics as the identity.

**Keywords:** campus landscape, higher education institutions, sustainability, systematic review.

### 1. INTRODUCTION

In the context of climate change and global warming, real environmental problems need to be solved immediately [1]. Since the 1970s, environmental awareness has been emerging in the field of higher education [2]. Higher education institutions play a key role in sustainable development [3]. Since then, higher education institutions have attempted to address environmental issues through the concepts of green campus, sustainable education, sustainable school, and sustainable campus [1, 3-11]. In particular, the concept of a sustainable campus has been applied by many higher education institutions around the world with varying success levels, standards, and implementation strategies [1].

A Sustainable Campus is defined as an environmentally oriented campus that integrates environmental science into its policies, management, and scholarly activities [12, 13]. Campus sustainability is of growing importance, not only as a means to minimize environmental harm but also as a way to promote concepts of ecological health, human well-being, and sustainable systems [14].

Currently, higher education institutions have implemented a range of different sustainability strategies for curricula, research, leadership, management, community outreach, policy analysis, institutional visions, infrastructure operations, and resource management [2, 13, 15-20].

The landscape is an important element of the campus reflecting the identity and values of higher education institutions [14, 15]. In addition, it provides space to study, play, and outdoor events, improving ecological and aesthetic values [14, 15, 21]. One aspect to be considered in a sustainable campus is the landscape factor [22]. A sustainable campus landscape has been successfully implemented in many famous higher education institutions around the world. However, the argument for a sustainable campus landscape has not been explicitly summed up in the research literature.

Higher education in Vietnam has achieved a large growth in the recent two decades [23]. There were more than 237 universities and colleges [24] with 1.67 million students by the end of 2019 [25]. The development of higher education institutions in Vietnam has brought

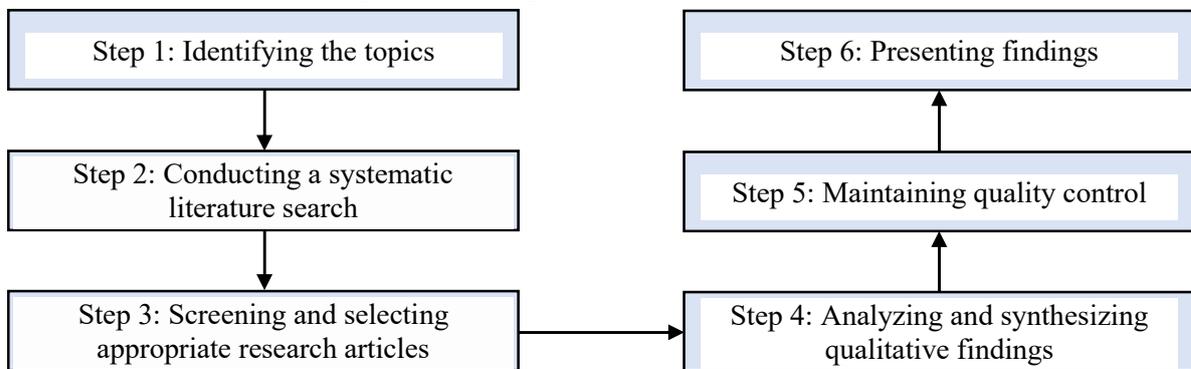
the construction boom of the new campus and the extension of old campuses, while the campus landscape has not been emphasized. The campus landscape has not been explored to promote sustainability. To address this gap, this paper provides a systematic and comprehensive review of the literature on the sustainable campus landscape. The various aspects outlined in this research can be used as a reference for building a sustainable campus landscape for higher education institutions in Vietnam.

The paper is organized as follows. First, we conduct a literature review, focusing on the trends of sustainable campus landscape development worldwide. Second, we examine the current situation of campus landscape

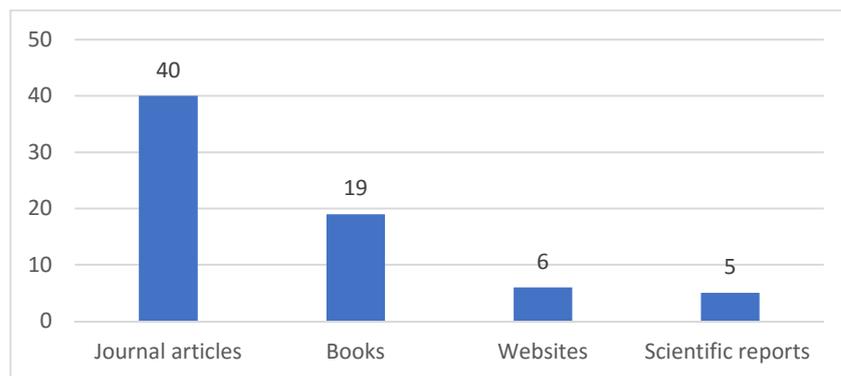
development in higher education institutions in Vietnam. Finally, we discuss aspects of building a sustainable campus landscape model in Vietnam.

**2. RESEARCH METHODS**

We use the qualitative systematic review method (The phases related to qualitative systematic review are presented in Fig. 1). Systematic review of all studies related to sustainable campus and sustainable campus landscape topics. The number of research materials used as the basis for a systematic review is 70 articles, mainly collected from journal articles, books, websites, and scientific reports in conferences and forums (Fig. 2).



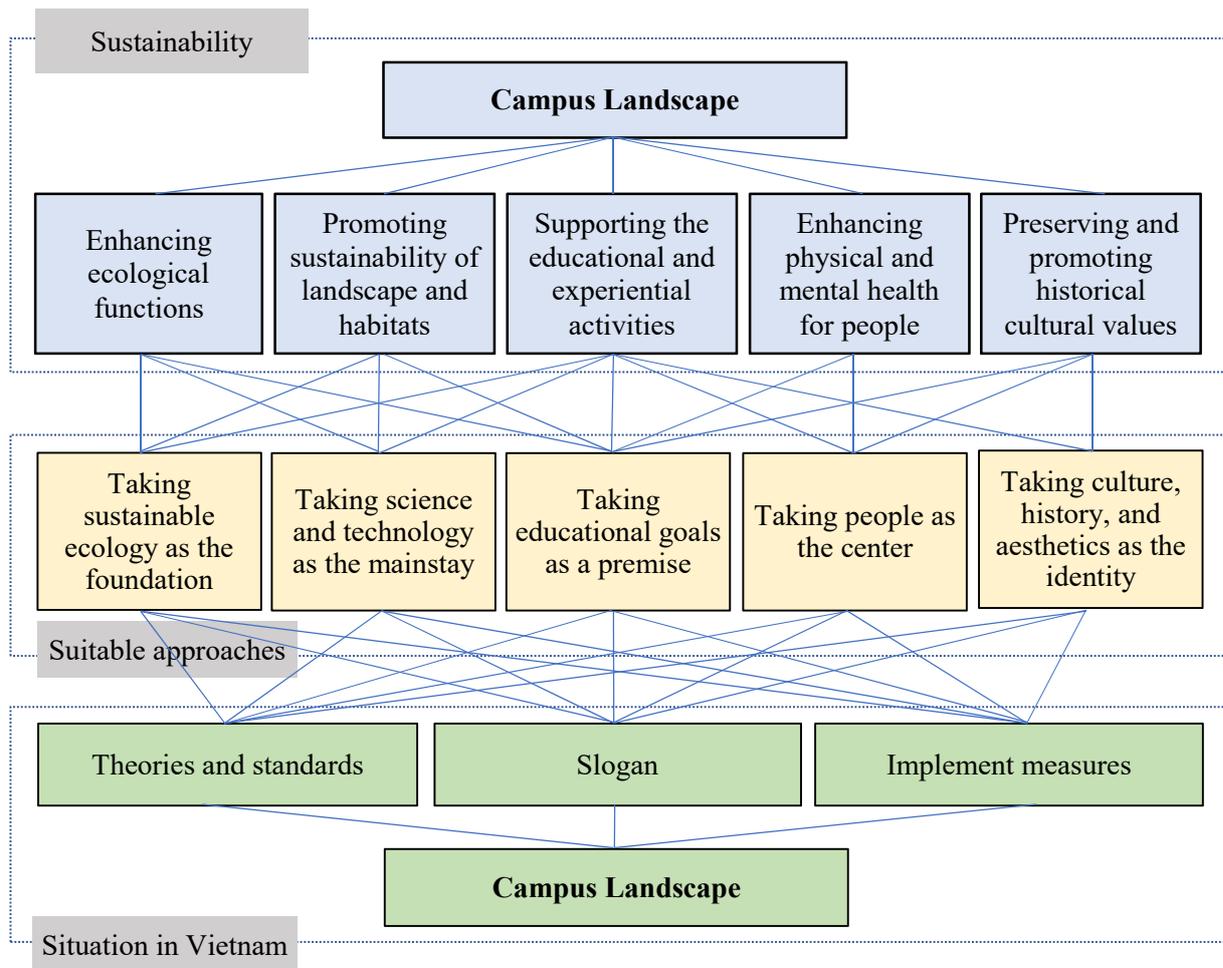
**Figure 1. Steps of the qualitative systematic review**  
 (Source: Modified from Sugiarto et al., 2022) [1]



**Figure 2. Types of research materials**  
 (Source: Painted by the author)

In the aggregation approach, the research topics are elaborated further into certain themes to produce an analytical framework (Fig. 3). This analytical framework includes three modules: (1) Identifying trends in developing sustainable campus landscapes worldwide, (2) Considering the current situation of campus landscape development in higher education

institutions in Vietnam, and (3) Developing aspects for building a sustainable campus landscape model in Vietnam. For each theme, the study searches for relevant articles compares and summarizes these articles. The research results are the aggregate of various studies on relevant themes in to deepen the research themes.



**Figure 3. A new framework for a sustainable campus landscape approach in Vietnam**  
 (Source: Painted by the author)

**3. RESULTS AND DISCUSSION**

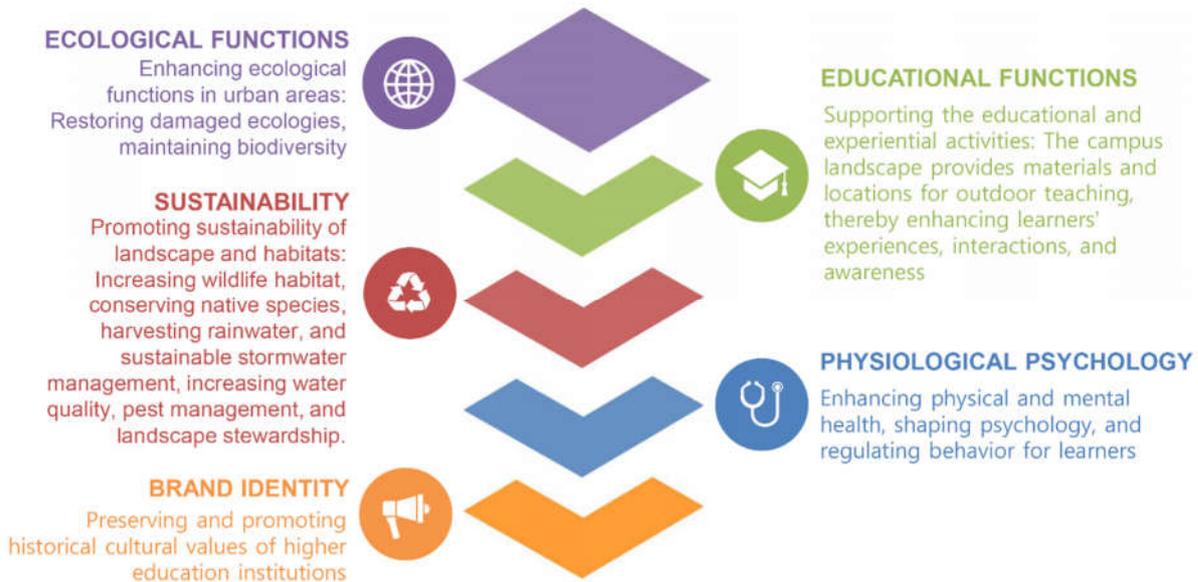
**3.1. Sustainable campus landscape**

In the book “University Architecture”, B. Edwards has defined Landscape architecture as a delicate art, in which (1) The main users are the students and academics, (2) The most important function of the landscape is to create and maintain a space close to nature, (3) Enhancing the importance of open space and participant interaction on campus, (4) Considering cultural - social - historical values in landscape design planning [26, 27].

In the book “Campus Landscape”, Richard P. Dober has defined Campus landscape design as an interdisciplinary art between architecture, landscape architecture, and urban design. It provides the appropriate foundation to organize the space in harmony with nature through ideas and sustainable landscape design measures.

Thereby, enhancing the spatial experience of learning, while meeting the physical and mental needs of everyone on campus [28].

Currently, the sustainability of the campus landscape has not been fully documented [15]. Research by Anis et al. indicates that landscape is one of the main basic aspects that play an important role in achieving environmental, social-behavioral, and aesthetic outcomes [29]. Mahayudin et al. show that a sustainable campus using the landscape concept needs to effectively incorporate nature into the landscape, in order to restore damaged ecosystems, increase biodiversity, promote human health, provide secure livelihood, and campus aesthetic [30]. The literature review reveals a sustainable campus landscape must be expressed through five aspects including (Fig. 4).



**Figure 4. Aspects of a sustainable campus landscape**  
 (Source: Painted by the author)

**(1) Enhancing ecological functions in urban areas**

Rapid urbanization is accelerating the transformation of urban natural surfaces and poses a serious challenge to the sustainable and healthy development of cities [31-33]. Campus landscapes are large spaces that have a huge impact on the environment and the quality of human life in urban areas [34]. In the recent decade, many studies have been done on the impact of campus landscape on urban ecological functions [14].

In cities, the campus landscape is the second largest green space behind parks. Although the area is small, the campus landscape has the potential to make a major ecological contribution. The campus landscape connects with other green spaces in urban areas through ecological corridors to shape an ecological network where living beings can shuttle between different habitats, contributing to the protection of urban ecological safety, maintaining biodiversity, and guaranteeing urban sustainable development [31].

**(2) Promoting sustainability of landscape and habitats**

Campus landscape sustainability is increasingly important, not only as a way to reduce impacts on the urban environment but also to promote the implementation of measures to improve ecological function and human

health [14]. Patrick et al. indicate that sustainable campus landscaping is the appropriate management of resources through teaching, research, implementation, operations, and coordination to reduce the negative impact on the environment [35].

Campus landscapes can foster biodiversity conservation and ecosystem services [36, 37]. The ecological benefits of sustainable landscapes can be seen include increased wildlife habitat, nurturing and conserving native plant species, sustainably managed stormwater runoff and rainwater harvesting, increased water quality, sustainable energy production, green infrastructure, pest management, microclimate creation, landscape stewardship, and remediation of toxic sites [14, 20, 37-40].

**(3) Supporting the educational and experiential activities**

The landscape is increasingly employed to support student learning [14]. The campus landscape is a visual teaching material on natural sciences, as well as an ideal place for outdoor teaching activities, contributing to improving the physical and mental health of the student. In addition, outdoor experiential education attracts learners to participate in learning to acquire new knowledge and skills, realize the value of ecological landscapes, and protect the living environment [31]. “Living laboratory” is an increasingly popular term to

encompass a range of strategies that engage students, faculty, staff, and the community to participate in sustainable activities in higher education institutions [20, 41]. Living laboratories are promoted as a means to support campus sustainability, mental restoration, and student engagement and learning [14].

Open space is an important element in the campus landscape, increasing the various activities and interactions among campus attendants. Many studies show that the campus open spaces can enhance students' learning experiences through outdoor teaching activities [27, 42-45]. Based on environmental psychology and Gifford's theories, humans are always exposed to interaction with their surroundings. Social behavior cannot happen haphazardly and involves not only an individual but also how it interacts with its surroundings. Psychologists believe that psychological phenomena and their interpretations are the results of interactions between humans and the environment. Teaching and training are not only influenced by the teacher's words, but also by many external factors including the educational environment [46]. According to Morong, teaching outdoors is much more effective than teaching in closed spaces, as it inspires and motivates learners' creativity [47].

#### **(4) Enhancing physical and mental health for people**

On campus, students spend a significant amount of time engaged in activities of living, working, and studying that require intense attention and concentration [48, 49]. Mental and physical health issues are a growing concern for college and university students worldwide, both in terms of prevalence and severity [50]. These issues include stress, anxiety, and exhaustion leading to student dropout related to heavy course loads, financial constraints, and health, social or psychological matters [51, 52]. A healthy learning and working environment should support students to maintain a balance of pressure and ensure reasonable rest time, and the campus landscape is viewed as a space that can be restorative to student health and well-being [48, 51, 53, 54]. Increasingly, the campus

landscape is meant as a place to experience daily life, which promotes health by creating recreational activities to relieve physical and mental fatigue and stress [55-57].

The campus is an educational environment that plays an important role in shaping learners' psychology and behavior. In particular, the campus landscape affects the emotional, intellectual, and perceptual perceptions of learners. On a personal level, the campus landscape creates familiarity, proximity, flexibility, and inspiration. Thereby, promoting the place of learners in these spaces, making the presence of learners in these spaces more frequent and vibrant. At the group level, the landscape has the effect of connecting relationships and teamwork, enhancing the sense of responsibility and social communication. Therefore, paying attention to designing campus landscapes can play a very important role in enhancing or inhibiting a community [27].

#### **(5) Preserving and promoting historical cultural values**

The campus landscape is the element that most strongly reflects the identity and traditional values of higher education institutions, and it is clearly expressed through the built environment [15]. Consideration of campus landscapes also can be linked to historic preservation and campus heritage planning [14].

The campus landscape is the element that holds the most memories in learners' memory (including landscaping on the way to class, lawns, outdoor public activity areas, exercise areas, sports areas, etc.). In addition, the impression of the campus landscape also affects the initial decision of students to study at educational institutions as a channel for shaping the brand, cultural values, history, and traditions values of these educational institutions [58].

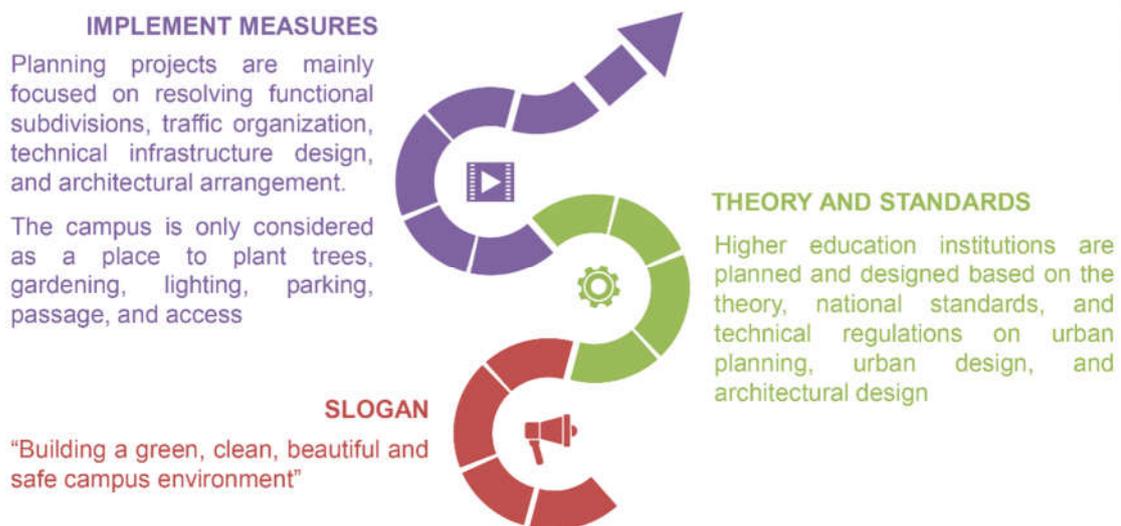
#### **3.2. Campus landscape in Vietnam**

The Vietnamese higher education system includes colleges and universities. Over the past two decades, the number of higher education institutions has increased fourfold [59]. The rapid growth in the number of new higher education institutions has caused many risks for

quality assurance and governance [60, 61]. The expansion of the training scale has brought the construction boom of the new campus and the extension of old campuses, while the low performance of campus facilities and the campus landscape has not been emphasized.

Higher education institutions are planned and designed based on the theory, national standards, and technical regulations on urban planning, urban design, and architectural design [62-64]. Planning projects are mainly focused on resolving functional subdivision, traffic organization, technical infrastructure design, and architectural arrangement [65] with the

slogan "Building a green, clean, beautiful, and safe campus environment" [66] (Fig. 5). Most works only focus on solving internal space but lack of cohesion with the outside space. The campus is only considered as a place to plant trees, gardening, lighting, parking, passage, and access but has not linked 3 important aspects in the landscape design (including socio-cultural, ecological, and aesthetic) to link people with nature. The landscape on the campus has not been explored and shaped based on creativity and art with the support of a scientific theory to work towards a sustainable campus landscape in Vietnam.



**Figure 5. Construction of the campus landscape in Vietnam**

*(Source: Painted by the author)*

### 3.3. Towards a sustainable campus landscape in Vietnam

Through a literature review and examining the current situation of campus landscape development in higher education institutions in Vietnam, we find that there are 5 key aspects to building a sustainable campus landscape model that is suitable for Vietnam include: (1) Taking educational goals as a premise, (2) Taking people as the center, (3) Taking sustainable ecology as the foundation, (4) Taking science and technology as the mainstay, (5) Taking culture, history, and aesthetics as the identity (Fig. 6).

#### (1) Taking educational goals as a premise

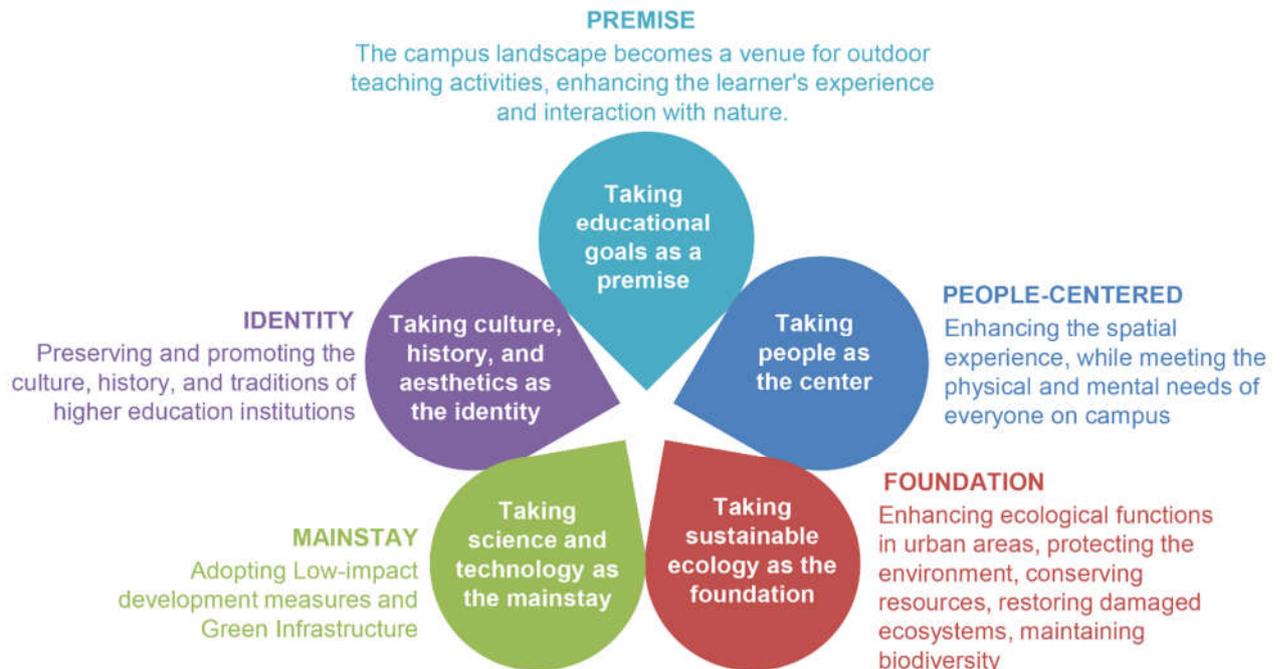
Concretizing the target of higher education (in Law No. 08/2012/QH13 on higher

education): Higher education institutions have the task of training human resources in order to create knowledge and new products serving the socio-economic development; Training students that possess the knowledge and professional practice skills, possess creativity, professional responsibility, and adaptability to the working conditions.

The results of the literature review indicate that the campus landscape is an important factor supporting teaching and learning. The campus landscape becomes a venue for outdoor teaching activities, enhancing the learner's experience and interaction. Thereby, supporting students in learning, acquiring new knowledge and skills, recognizing the value of ecological landscapes, and protecting the living

environment. As such, the sustainable campus landscape model plays an important part in promoting the implementation of the

university's sustainable development goals and programs.



**Figure 6. Towards a sustainable campus landscape in Vietnam**

*(Source: Painted by the author)*

**(2) Taking people as the center**

“People-centered” is an important principle in all areas of design to focus on solving specific human needs, thereby giving designers a more humanized view of their responsibilities to people and society [67]. It is the same as the teaching approach "Learner-centered" is widely implemented in Vietnamese higher education (a teaching approach to promote the initiative and creativity of learners)

Currently, mental and physical health issues are a growing concern for college and university students including stress, anxiety, and exhaustion due to the pressure in learning and life. The campus landscape is meant as a place to experience daily life, which promotes health by creating recreational activities to relieve physical and mental fatigue and stress. In addition, a healthy learning and working environment play an important role in shaping learners' psychology and behavior, thereby developing personal identity at a significant stage in their lives.

**(3) Taking sustainable ecology as the foundation**

Since the landscape is part of a natural ecosystem, campus landscapes are large entities with huge impacts on the environment and the overall sustainability of the area [34]. Rapid urbanization poses a series of challenges to the sustainable and healthy development of cities. The contributions of higher education institutions in enhancing ecological sustainability are manifested in their commitments to develop sustainable campuses (including protecting the environment, conserving resources, restoring damaged ecosystems, and maintaining biodiversity). This is considered a new perspective in the strategy of building educational institutions to promote campus sustainability in Vietnam.

**(4) Taking science and technology as the mainstay**

Climate and environmental changes have turned sustainability into an important topic in various fields, including higher education. Higher education institutions are seen as pioneers in the implementation of sustainable development strategies (such as in teaching, research, building, and campus) [19]. In recent

years, a variety of measures have been studied and applied for sustainable campus landscape construction, such as Low-impact development and Green infrastructure.

The goal of Low-impact development and Green infrastructure measures is to make efficient use of green land and manage stormwater in a manner that imitates natural hydrology (with emphasis on rainwater harvesting, control of water quality control, reuse, and minimal water consumption). The benefits of low-impact development measures and Green infrastructure are reflected in the following aspects. First, these measures help effectively protect the environment: removing pollutants from rainwater, reducing the overall volume of rainwater, managing flows, and replenishing streams and wetlands. Second, reduce flooding: reducing impervious surfaces, increasing vegetation, and water infiltration results in less runoff (this reduces the possibility of flooding due to heavy rains). Third, help protect human health by more effectively removing pollutants from rainwater. Fourth, protect drinking water supplies: by filling rainwater into rivers, streams, and ponds, thereby recharging the aquifers. Fifth, provide cost-effective alternatives to upgrading drainage infrastructure. Finally, increase the appearance and aesthetics of the community: Low-impact development and Green infrastructure projects leave more trees and plants and have fewer impervious surfaces [68]. Low-impact development and Green Infrastructure are two measures that can be applied not only in the campus landscape but also in a larger scope such as cities.

#### **(5) Taking culture, history, and aesthetics as the identity**

The Resolution of the 5th Party Central Committee (8th tenure) emphasized that culture is the spiritual foundation of society, both a goal and a driving force for socio-economic development. The benefits of preserving and promoting cultural heritage values as the driving force for the country's sustainable development [69].

The role of higher education in sustainable development is to facilitate the fundamental

moral, cultural, and aesthetic changes necessary for creating a sustainable society [2, 17, 70]. The campus landscape is the element that most strongly reflects the identity and traditional values of higher education institutions as a channel for shaping the brand, cultural values, and historical values of these educational institutions. In addition, the campus landscape is also a place to impart knowledge, and form a humanistic atmosphere that contributes to enhancing the students' concept of sustainable development. Therefore, preserving and promoting the culture, history, and traditions is an extremely important aspect that needs to be studied to promote the sustainability of higher education institutions in Vietnam.

#### **4. CONCLUSION**

Through an extensive literature review, we found that landscape is an important factor promoting the sustainability of higher education institutions and has been explored in various research papers from different points of view. The effort to realize a sustainable campus landscape in different countries has been portrayed through several research results. However, neither higher education institution is an exemplar of a sustainable campus landscape at this time, but they have potential paths towards sustainability in their context. Thereby, we identify the variety of strategies and ways they want to create a sustainable campus. Five key aspects must be studied to implement a sustainable campus landscape including (1) Ecological functions (Enhancing ecological functions in urban areas: Restoring damaged ecologies, maintaining biodiversity); (2) Sustainability (Promoting sustainability of landscape and habitats: Increasing wildlife habitat, conserving native species, harvesting rainwater, and sustainable stormwater management, increasing water quality, pest management, and landscape stewardship); (3) Educational functions (Supporting the educational and experiential activities: The campus landscape provides materials and locations of outdoor teaching, thereby enhancing learners' experiences, interactions, and awareness); (4) Physiological psychology (Enhancing physical and mental health, shaping

psychology and regulating behavior for learners); (5) Brand identity (Preserving and promoting historical cultural values of higher education institutions).

Currently, sustainability has not yet become a specific goal and mission in the development strategies of higher education institutions in Vietnam. The concept of a sustainable campus landscape is not mentioned in research documents or results. We urge higher education institutions in Vietnam to change in cognition to foster innovation toward building a more sustainable campus landscape in the future. The approaches can make an important contribution to this success including: First, taking educational goals as a premise (Concretizing the target of higher education associated with sustainable development strategy. Thereby, emphasizing the campus landscape must be a venue for outdoor teaching activities to improve the knowledge, skills, experience, and interaction of learners with nature). Second, taking people as the center (The campus landscape supports enhancing the spatial experience, meeting the physical and mental needs of everyone on the campus. Thereby, forming a healthy learning and working environment, making an important role in shaping psychology and adjusting the behavior of the learners). Third, taking sustainable ecology as the foundation (Environmental protection is the responsibility of organizations and institutions. In particular, the landscape plays the main role to improve the ecological function in urban areas, conserve resources, restore damaged ecosystems, and maintaining biodiversity). Fourth, taking science and technology as the mainstay (Adopting Low-impact development measures and Green infrastructure. These are two measures with many ecological and environmental benefits that can be applied not only in the campus landscape but also in a larger scope such as cities). Finally, taking culture, history, and aesthetics as the identity (The landscape is considered a heritage of higher education institutions. It records the cultural, historical, and traditional values of the past generations and shapes the path toward future generations).

This research result is expected to be a driving force and reference for researchers, strategists, and managers to realize a sustainable campus landscape model suitable for Vietnam. We hope that readers will find our results as a starting point for shaping more sustainable campus landscapes in their work.

**Acknowledgment:** This research is funded by the University-level scientific research project: “Proposing landscape design ideas for the administrative area and the spatial axis from the main gate to the student square of the Vietnam National University of Forestry” (LN. KC-2022.30). The authors would like to thank the reviewers for their valuable remarks and comments. Also, the authors thank the experts and colleagues who helped conduct this research.

**Conflicts of Interest:** The authors declare no conflict of interest.

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## CẢNH QUAN KHUÔN VIÊN BỀN VỮNG TẠI VIỆT NAM: TỔNG QUAN TÀI LIỆU CÓ HỆ THỐNG

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### TÓM TẮT

Các cơ sở giáo dục đại học trên thế giới đã áp dụng nhiều chiến lược bền vững trong chính sách, quản lý và các hoạt động học thuật. Tuy nhiên, cảnh quan khuôn viên vẫn chưa được nghiên cứu để phát huy tính bền vững. Để giải quyết vấn đề này, bài báo cung cấp một tổng quan có hệ thống và toàn diện các tài liệu về cảnh quan khuôn viên bền vững. Các khía cạnh khác nhau trong nghiên cứu này có thể được sử dụng làm tài liệu tham khảo trong quy hoạch thiết kế cảnh quan khuôn viên ở các cơ sở giáo dục đại học tại Việt Nam. Kết quả của nghiên cứu chỉ ra rằng cảnh quan khuôn viên bền vững trên thế giới thể hiện qua 5 khía cạnh bao gồm: (1) Tăng cường chức năng sinh thái đô thị, (2) Thúc đẩy tính bền vững cảnh quan và môi trường sống, (3) Hỗ trợ các hoạt động giáo dục và trải nghiệm, (4) Nâng cao sức khỏe thể chất và tinh thần, (5) Bảo tồn và phát huy các giá trị văn hóa lịch sử. Qua đó, Việt Nam cần thay đổi nhận thức để thúc đẩy đổi mới, hướng tới xây dựng mô hình cảnh quan khuôn viên bền vững hơn ở các cơ sở giáo dục đại học trong tương lai. Các khía cạnh tiếp cận phù hợp với Việt Nam bao gồm: (1) Lấy mục tiêu giáo dục làm tiền đề, (2) Lấy con người làm trung tâm, (3) Lấy sinh thái bền vững làm nền tảng, (4) Lấy khoa học và công nghệ làm trụ cột, (5) Lấy văn hóa, lịch sử và thẩm mỹ làm bản sắc.

**Từ khóa:** cảnh quan khuôn viên, cơ sở giáo dục đại học, tính bền vững, tổng quan có hệ thống.

Received : 12/8/2022

Revised : 14/9/2022

Accepted : 29/9/2022