

The Role of Green Universities in Achieving Sustainable Development: A Case Study of Sherbrooke University

دور الجامعات الخضراء في تحقيق التنمية المستدامة – دراسة حالة جامعة شيربروك

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Abstract:

Green universities aim to promote sustainable development by embedding sustainability principles into their programs and activities. Their efforts center on raising awareness, advancing education, fostering research and innovation in environmental and societal fields, and implementing eco-friendly practices on campus. Additionally, they focus on building strong community partnerships and encouraging sustainable behaviors among students and faculty. This study sought to explore the role of green universities in advancing sustainable development, emphasizing the green practices adopted by universities in general and by the University of Sherbrooke in particular. Achieving these goals can yield numerous benefits, such as integrating sustainable environmental practices into all university operations and encouraging research and innovation in environmental conservation and renewable energy.

Keywords: Sustainable development; green universities; Sherbrooke University

JEL Classification Codes: I23, Q56

ملخص:

تسعى الجامعات الخضراء جاهدة لتحقيق التنمية المستدامة من خلال دمج مبادئ الاستدامة في أنشطتها وبرامجها. تركز جهودها على التوعية والتعليم، والبحث والابتكار في مجالات البيئة والاجتماع، وتطبيق الممارسات البيئية على الحرم الجامعي. بالإضافة إلى ذلك، تعمل على بناء شراكات مجتمعية قوية وتشجيع الطلاب وأعضاء الهيئة التدريسية على تبني سلوكيات مستدامة.

وهدفت الدراسة إلى إبراز على دور الجامعات الخضراء في تحقيق التنمية المستدامة، وكذا إبراز ممارسات الخضراء من طرف الجامعات من جهة ومن طرف جامعة شيربروك "Sherbrooke" من جهة أخرى، في حين ان تحقيق هذا الإنجاز سينجر عنه الكثير من الفوائد منها دمج الممارسات البيئية المستدامة في كافة جوانب الجامعة. وتشجيع البحث والابتكار في مجالات البيئة والطاقة المتجددة.

كلمات مفتاحية: التنمية المستدامة، الجامعات الخضراء، جامعة شيربروك "Sherbrooke"

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INTRODUCTION:

In an era marked by increasing awareness of sustainability and environmental protection, green universities have become pivotal in driving the transformation toward more sustainable societies and a sustainable development agenda. These institutions stand out for their ambitious vision of integrating environmental and sustainability principles into all operations, from infrastructure to educational, research, and administrative activities.

Green universities embody a spirit of innovation and a steadfast commitment to implementing the best environmental and social practices across all academic and administrative life dimensions. By harnessing renewable energy, managing resources efficiently, and fostering awareness of environmental challenges, these institutions strive to achieve a sustainable balance between present needs and future aspirations.

Green universities embrace sustainability principles by implementing practices that conserve natural resources and reduce the effects of environmental degradation. This includes using renewable energy, effective waste management, and improved resource efficiency. Green universities are also characterized by a spirit of innovation and a commitment to applying the best environmental and social practices in all aspects of their academic and administrative life.

Green universities play a crucial role in educating and inspiring students and local community members to adopt sustainable practices in their daily lives. By incorporating sustainability concepts into their educational and research programs, these institutions aim to prepare new generations of leaders and innovators capable of driving positive change toward a more sustainable and prosperous future.

Based on this premise, the central question guiding this study is:
What is the role of green universities in promoting sustainable development, both generally and specifically at the University of Sherbrooke?

To address this question, the study is organized into four main sections:

- **Sustainable Development**
- **Green Universities**
- **Green University Practices for Achieving Sustainable Development**
- **Case Study: The University of Sherbrooke**

Study objective:

The study explores the concepts of sustainable development and green universities, emphasizing the green practices these institutions should implement. These practices align lifestyles, educational, research, and administrative activities with sustainability principles. Green universities are vital hubs for fostering environmental awareness and promoting sustainable practices across various aspects of life, benefiting students, faculty, and the broader local community.

Study Methodology:

This study employs a descriptive-analytical method. The descriptive approach is utilized to explore and analyze the study's primary problem and examine its various dimensions within the theoretical framework by addressing the concepts and foundational theories related to the

study variables. The analytical approach complements this by providing commentary and insights based on the described elements.

1- Sustainable development:

1-1-Definition of sustainable development:

The concept of sustainable development emerged as a response to two pressing challenges: the need to preserve the environment and the demand for economic development, particularly in the world's poorest countries (Philipp Langenieux-Villard et al., 2007, p. 45). Norwegian Prime Minister **Gro Harlem Brundtland** was the first to officially introduce "sustainable development" in 1987 through the report *Our Common Future*. This report emphasized the importance of achieving justice and equality between current and future generations. Brundtland defined sustainable development as "Meeting the needs of the present generation without compromising the ability of future generations to meet their own needs" (Audrey Aknin, 2002, p. 50).

This definition of sustainable development rests on two key pillars: addressing human needs, particularly the fundamental needs of the poor, and recognizing the limitations imposed by technology and social organization on the environment's capacity to meet present and future demands (Mohamed Abdel Badie, 2003, p. 84). The World Bank views sustainability through the lens of capital. It defines sustainable development as "That focuses on achieving continuous equity, ensuring that future generations have access to the same opportunities for advancement as the present generation, by maintaining or increasing comprehensive capital over time" (Gendron Corinne, 2006, p. 166).

According to the 1981 report by the International Union for Conservation of Nature (IUCN), titled *International Strategy for Environmental Conservation*, sustainable development is defined as "The constant endeavor to improve the quality of human life while considering the capabilities and potential of the ecosystem that supports life" (Hamid Abdallah Al-Hartsi, 2005, p. 23). Sustainable development can be categorized into four key dimensions: economic, social, environmental, and technological.

1-1-1-Economic definition: sustainable development involves a deep and ongoing assessment of energy and natural resource consumption in industrialized countries in the North, encouraging significant changes in prevailing lifestyles and persuading them to export their industrial model globally. For poor countries, it means utilizing resources to improve the standard of living for the poorest populations in the South (Nadia Hamdi, 2003, p. 31).

1-1-2-Social definition: sustainable development aims for stable population growth and enhancing health and education services, especially in rural areas (Muhammad Salih Al-Sheikh, 2002, p. 92).

1-1-3-Environmental definition: sustainable development encompasses protecting natural resources, mainly agricultural and animal resources, and optimizing agricultural land and water resources to increase global green spaces (Abdul Khaliq Abdullah, 1998, p. 245).

1-1-4-Technological definition: on a technological level, sustainable development means transitioning society to an era of applied industries that utilize environmentally regulated technology and minimize the emission of polluting, heat-trapping, and ozone-damaging gases (Muhammad Salih Al-Sheikh, 2002, p. 92).

1-2-Sustainable Development Goals: Sustainable development aims to achieve a set of goals as outlined by Al-Arabi Hadjam Samiha Tariq (2019, p. 131):

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1-2-1-Reducing global poverty by addressing the needs of the poorest classes.

1-2-2-Researching environmental developments, focusing on understanding their impacts on different countries, sharing successful experiences in environmental protection, and exploring new avenues for international cooperation.

1-2-3-Considering economic developments, specifically the effects of globalization and strategies to leverage its benefits, especially in enhancing the role of the private sector, increasing its competitive capabilities, and achieving the optimal use of natural and human resources.

Sustainable development aims to eradicate poverty and improve the quality of life for populations, both economically and socially, by promoting balanced production and consumption patterns that do not overly depend on natural resources.

1-3-Dimensions of sustainable development : the concept of sustainable development encompasses multiple interconnected dimensions contributing to its achievement. According to Nasser Mourad (2009, p. 108):

1-3-1-Economic Dimension: sustainability involves the continuity and maximization of economic well-being over the most extended possible period by providing human well-being components like food, housing, transportation, clothing, health, and education at the highest quality.

1-3-2-Social Dimension: the social aspect of sustainable development focuses on people as the core of development, aiming for social justice, combating poverty, and providing social services to all in need. It also ensures democratic participation through transparency and public involvement in decision-making processes.

1-3-3-Environmental Dimension: this dimension emphasizes respecting environmental limits, where each ecosystem has defined thresholds that should not be surpassed in consumption and depletion. Exceeding these limits can lead to ecosystem degradation. Therefore, limiting consumption, population growth, pollution, poor production practices, water depletion, deforestation, and soil erosion is essential .

1-3-4-Technological Dimension: this involves adopting cleaner technologies in industrial processes. The inefficient use of technology or waste processes, especially in developing countries, can lead to pollution. Sustainable development encourages the shift to cleaner and more efficient technologies that minimize energy and natural resource consumption. These technologies reduce pollutants and promote waste recycling while maintaining traditional technologies that meet sustainability criteria (Abdelkader Belkhedher, 2005, p. 102).

2- Green Universities:

2-1-Definition of Green Universities:

A green university is defined as “an educational institution that meets its own needs for natural resources, such as energy, water, and materials, without compromising the ability of people in other countries and future generations to meet their own needs.” The term green university is also recognized worldwide as “all types of activities within the framework of the vision of sustainable development, representing a key responsibility of higher education for societal development” (Fadhila Boutra, Alaaeddine Al-Wafi, 2020, p. 844).

2-2-Green University Objectives:

In light of the above, green universities aim to: (Desouki, 2023)

- Contribute to spreading the culture of sustainability.
- Ensure all students engage with sustainability and environmental issues through their courses or extracurricular activities.
- Promote environmentally friendly university buildings.
- Reduce waste through recycling, organic waste as natural fertilizer, and water reuse.
- Maximize biodiversity by purchasing organic foods, creating green spaces, and avoiding toxic chemicals.
- Promote social change around sustainability goals.
- Contribute to achieving global environmental conservation goals.

2-3-Sustainability of Universities:

Education is one of the most influential means of achieving and transforming sustainability. Sustainable education is “an educational vision that aims to strike a balance between human and economic prosperity, traditions and culture, and the sustainability of natural and environmental resources, promoting a better life for individuals and society both now and in the future. It also positively contributes to environmental protection and enhancing social cohesion” (Hassina Khalidi, Sabri Moukim, 2022, p. 90).

Sustainable universities can be described as: “Higher education institutions that work to minimize negative environmental, economic, and societal impacts on health when utilizing their resources and core functions of teaching, research, awareness, partnership, and supervision. They aim to help society transition towards sustainable lifestyles” (Hassina Khalidi, Sabri Moukim, 2022, p. 91).

2-4-The basic pillars of sustainability in universities: According to Hassina Khalidi and Sabry Moukima (2022, p. 91), the basic pillars of sustainability in higher education are:

2-4-1-Academic Sustainability: This pillar involves academic efforts and activities related to education, training, awareness, and culture carried out by universities and their affiliated entities, both inside and outside the university campus. It aims to promote sustainability and facilitate the transition towards sustainable practices across all aspects of academic life.

2-4-2-Research Sustainability: This pillar includes efforts and activities focused on research, innovation, inventions, and development carried out by universities and their affiliated entities, both inside and outside the university. The goal is to enhance sustainability and support the transition to sustainable practices through new knowledge and innovative solutions.

2-4-3-Social Sustainability: This pillar encompasses universities' and affiliated entities' efforts and activities that address social aspects and community service. These activities aim to promote and transform sustainable behaviors, whether within the university or in the broader community.

2-4-4-Environmental Sustainability: This pillar pertains to efforts and activities related to various environmental aspects, conducted by universities and their affiliated entities both inside and outside the university campus. It aims to prevent the depletion or degradation of natural resources and to maintain long-term environmental quality.

3- Green university practices to achieve sustainable development:

3-1-Use of Green Energy:

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Green energy refers to energy derived from renewable natural resources such as sunlight and wind, which are replenished at a rate higher than they are consumed. The most prominent forms of green energy include solar energy, wind energy, hydroelectric energy, geothermal energy, biomass energy, tidal wave energy, and energy from temperature differences in the depths of seas and oceans. Green energy is sustainable and environmentally friendly as its use does not produce waste such as carbon dioxide and harmful gases that contribute to global warming (Elalmi Fatima, Khalifa Al-Hadj, 2020, p. 863).

3-2-Green Buildings:

Green buildings, as defined by William Reed, are “buildings that are designed, constructed, and managed with consideration for the environment. They aim to minimize the impact of the building on the environment and reduce construction and operational costs” (Samiha Khennous, Souad Obaid, 2020, p. 175). Ken Yeang further defines green or sustainable architecture as buildings that meet the present needs without compromising the future generation's ability to meet their own needs. The design process emphasizes minimizing adverse impacts on the Earth's ecosystem and natural resources, prioritizing sustainability in all aspects (Fouzia Barsouli, Samira Abdel Samad, 2023, p. 133).

-Principles of Green Buildings: the principles of green buildings include:
(Samiha Khennous, Souad Obaid, 2020, pp. 175-179).

- Conserve energy (do not drain energy).
- Adapt to climate.
- Use of environmentally friendly building materials.
- Reduce the use of new resources, such as using recycled materials, waste, and construction remains.
- Respect workers and users by considering various needs for privacy, and providing safety and protection for workers during work.
- Respect the site, avoid drastic changes to the construction site and make the most of the surrounding environment

3-3- Green libraries:

Green libraries are designed to minimize their negative impact on the natural environment while maximizing the indoor environment. This is achieved through careful site selection, using natural building materials, and biodegradable products, and conserving resources such as water, energy, and paper. Responsible waste disposal practices, including recycling, are integrated into the construction and renovation processes. Green libraries increasingly achieve sustainability through Leadership in Energy and Environmental Design (LEED) certification, a rating system for buildings administered by the U.S. Green Building Council (Ameur Djamila, 2023, p. 40).

The specialized dictionary of library and information science defines green libraries as synonymous with sustainable libraries. Green libraries are buildings designed to reduce their negative impact on the natural environment and enhance environmental quality. The principles of these libraries include careful site selection, using natural and biodegradable resources, conserving water, energy, and paper resources, and waste disposal through

recycling. These libraries increasingly aim to achieve sustainability (Samira Kashayri, Rabah Bourkab, 2023, p. 42).

3-5-Green Networks and Sites:

The computer and the Internet remain tools that can be utilized positively and negatively, depending on whether they are used for environmental purposes or predominantly business purposes that often exhibit environmentally irresponsible practices. Therefore, the Web and the Internet can be instrumental in spreading and enhancing green culture, through platforms such as environmental websites, forums, voluntary ecological awareness programs, and environmental campaigns. Environmentally friendly websites act as new and widespread activists working to disseminate positive environmental concepts and positions. The Internet can also serve as an effective channel for: (www.greennetfinland.fi)

- **Spreading Environmental Awareness:** Providing environmental information and identifying environmental issues for stakeholders and the general public.
- **Environmental Performance Assessment:** Offering services that measure and assess environmental performance, helping countries, sectors, and companies track progress or decline.
- **Supporting Environmental Protection Associations:** Creating effective environmental forums and pages to exchange opinions and positions, and foster environmental solidarity both within countries and across borders.
- **Environmental Initiatives:** Many websites and green networks offer new green environmental concepts, programs, and practices. Examples include: (Najm Aboud Najm, 2012, pp. 499-500).
- **Green Net Finland:** A network that provides green solutions to environmental problems by focusing on environmental business clusters and integrating the resources and expertise of companies. It also acts as a network of over a thousand environmental companies dealing with waste management in Finland. This network creates new opportunities for its member companies to export their expertise, know-how, and technology globally
- **Green Network Thailand (Green Net Thailand):** Established in 1993 to support the sustainable agriculture movement in Thailand by disseminating information about organic farming practices and granting Thai Organic Certification to agricultural companies that achieve this type of farming

3-6-Transportation within the university:

The transportation system significantly impacts carbon emissions and pollution levels on university campuses. Implementing policies that reduce the number of private cars, such as encouraging the use of campus buses and bicycles, can create a healthier environment. These initiatives also promote mobility among students, staff, and faculty members, reducing reliance on private vehicles. Using environmentally friendly public transportation further decreases carbon emissions on campus. Consider the following tips: (Desouki, 2023)

-Provide Bicycle Parking: Allocate sufficient space for bicycle parking. This will allow students and staff to use bicycles as a viable alternative to fossil fuel-dependent transportation and enhance mobility around the campus.

-Offer Public Transportation: Provide campus buses for staff and faculty members to commute to and from campus. This will reduce the need for private cars and consequently lower carbon dioxide emissions.

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-Support State Initiatives: Adopt initiatives like the Ministry of Youth and Sports' "Your Bike, Your Health" program. This program offers bicycles at reasonable prices to students and staff, encouraging active transportation and promoting a healthier lifestyle.

4- Case study of the University of Sherbrooke:

The University of Sherbrooke (UdeS) has distinguished itself globally in the field of Sustainable Development (SD), achieving an unprecedented performance by ranking first in the world in the international STARS ranking of higher education institutions. With an overall score of 92.73 points, UdeS not only retained its platinum certification but also became the first university in the world to surpass the 90-point mark. This achievement underscores UdeS's commitment to being a leader in sustainable development, setting an inspiring example for other institutions globally.

4-1-Key Sustainable Initiatives at UdeS:

4-1-1-Responsible Water Management:

UdeS has implemented several initiatives to protect and enhance water resources, including installing high-efficiency equipment such as low-flow toilets and replacing a water-cooling tower with an air-cooled system. The university has also used rainwater recovery systems, which have reduced drinking water consumption by 90%.

4-1-2-Achieving Carbon Neutrality:

The university has made significant strides towards sustainability by achieving carbon neutrality for emissions categories 1 and 2, eight years ahead of schedule. This was part of the university's 2030 Carbon Neutrality Strategy, which includes investment projects to improve energy efficiency, upgrade equipment, and adopt new renewable energy sources such as biogas and geothermal systems.

4-1-3-Strong Commitment to Biodiversity:

UdeS places a high value on biodiversity, integrating it into campus planning decisions and conservation initiatives. The university is analyzing to develop a biodiversity action plan that will apply to all campuses. Collaboration with local partners is key, including efforts to manage high ecological value areas like the Gonville Forest Ecological Park and Mont Belvaux Park, to have them recognized as a nature reserve.

These initiatives highlight UdeS's leadership in sustainable development and its role as a driving force for change, inspiring communities toward greener, more responsible, and more inclusive futures.

4-1-4-Solutions for single-car users:

The University of Sherbrooke continues to demonstrate strong leadership in greenhouse gas mitigation measures and sustainable practices across its campus:

-Electric Vehicle Charging Stations:

Several electric vehicle charging stations have been installed to support the university community's commitment to reducing carbon emissions. These stations are available for use by university members and visitors, encouraging the shift to electric vehicles and reducing the campus's carbon footprint.

-Alternative Transportation Options: Since 2021, UdeS has introduced a car-sharing service in collaboration with Communauto. This service allows UdeS' employees to borrow cars

during work hours and extends availability to the entire community in the evenings and weekends. This initiative provides a practical alternative to the single car, promoting sustainable commuting options.

4-1-5-Raise Awareness, Reduce, and Reuse:

UdeS has established a group of around 50 Responsible Waste Management Ambassadors, comprising staff and students, who work to raise awareness and educate their peers on proper waste segregation and management practices. Additionally, a guide to environmental responsibility in research has been created, providing guidelines for good laboratory practices, including supply management, transportation, event planning, health and safety, and handling of residual materials.

4-1-6-Sustainable Development and Environmental Programs:

-Programs : UdeS offers over thirty programs specializing in environmental or sustainable development topics across various disciplines, such as environmental management, chemistry, ecology, economics, and engineering. These programs reflect the university's commitment to integrating sustainability into education and preparing students for careers in environmental and sustainable fields.

-University Training Center for the Environment and Sustainable Development (CUFE): with over 40 years of experience, CUFE is Quebec's leading environmental training center. It offers a variety of training programs designed to meet the evolving needs of society and the labor market, providing education and skills development that align with sustainable development goals).

conclusion:

Sustainable green universities represent a cutting-edge higher education model that emphasises environmental and societal considerations. These institutions strive to incorporate sustainable environmental practices into all operations, from campus design to educational programs focused on sustainable development. They also aim to foster research and innovation in areas such as environmental science and renewable energy and promote environmental and social awareness among students and faculty. Sustainable green universities act as catalysts for change, bridging the gap between current needs and the environmental demands of future generations, working towards a balanced and sustainable future.

Recommendations:

Create research groups based on specialization to study sustainability practices at green universities.

-Focus on an Eco-Friendly Campus: Concentrate on developing an environmentally friendly university environment and fostering environmental and social awareness.

-Launch Sustainability Initiatives: Encourage university community members by creating sustainability awards and competitions.

-Develop a Committee for Sustainability: Form a special committee to align the university's courses and curricula with sustainability goals.

-Enhance Public Transportation: Provide public transportation (such as buses) for employees and faculty to commute to and from campus, aiming to reduce carbon dioxide emissions from personal vehicles.

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-Select Natural and Biodegradable Materials: Use environmentally friendly building materials and biodegradable products, conserve resources like water, energy, and paper, and manage waste responsibly through recycling and other practices.

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