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University Operations for Sustainable Development

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Synonyms

[Campus operation](#); [Campus sustainability](#); [Higher education for sustainable development](#); [Living labs](#); [Sustainability in higher education](#); [Sustainable campus](#)

Definition

University operations for sustainable development represent the set of principles and practices a university have aiming to promote sustainability in both its academic community and the surrounding communities. In this regard, sustainability is promoted by real-life experiences in campus, education, research and outreach practices, campus infrastructure, and by the adoption of an internal agenda for sustainable development. Therefore, with these operations universities become open laboratories for sustainable development. They promote awareness and education from within to

across campus boundaries enabling a holistic and sustainable development for all.

Introduction

With global challenges of environmental, economic, and social changes, universities play a key role in developing the necessary knowledge, innovations, and capacity building to increase the resilience of communities and promoting sustainable development (Guerra et al. 2016). Accordingly, several societal agents such as governments, civil society, and the international community urge for a more active role of educational institutions for sustainable development (Hancock and Nuttman 2014; Guerra et al. 2016; Lozano et al. 2015a). Many international conferences and declarations on sustainable development and higher education encouraged universities to adopt principles of sustainability in their operations, from campus to the institutional agenda (Berchin et al. 2018; Lozano et al. 2015b).

Among the international declarations on sustainable development and higher education, the Belgrade Charter (Unesco 1975), the Tbilisi Declaration (Unesco 1977), the Talloires Declaration (University Leaders for a Sustainable Future 1990), the Roadmap for Implementing the Global Action Programme on Education for Sustainable Development (Unesco 2014), the Sustainable Development Goals (United Nations 2017), and

the Education for Sustainable Development Goals (Unesco 2017) argued that university operations through their campuses should consider the environment in its totality (whole institution approach), integrating natural and man-made, ecological, political, economic, technological, social, legislative, cultural, and esthetic, thus considering institutional ecology policies and practices for sustainable development (University Leaders for a Sustainable Future 1990; Unesco 2014, 2017).

According to the Sustainable Development Goals (Unesco 2017), education for sustainable development “aims at developing competencies that empower individuals to reflect on their own actions, taking into account their current and future social, cultural, economic and environmental impacts, from a local and a global perspective,” helping individuals to develop “cognitive, socio-emotional and behavioural learning outcomes as well as the cross-cutting sustainability key competencies needed to achieve all the Sustainable Development Goals.”

Conceptualizing University Operations for Sustainable Development

Sustainable development is a highly complex concept integrating economic, social, and environmental development into a joint effort to improve intragenerational and intergenerational justice (Steiner and Posch 2006). In this context, higher education should integrate these debates in the content of learning, adopting more interactive methods for teaching for sustainable development; therefore, higher education for sustainability should consider the principles of interdisciplinarity, enabling a holistic approach and promoting a dialogue among disciplines; transdisciplinarity, enabling collaboration among academics/researchers and practitioners; and self-regulated learning, empowering students to assume a more active role in their own learning, increasing their responsibility, commitment, motivation, critical thinking, knowledge, and skills (Steiner and Posch 2006; Unesco 2017; Adom̄bent et al. 2014).

Among the dimensions of education for sustainable development, the Sustainable Development Goals also emphasize learning content and outcomes, pedagogy, and the learning environment, creating “interactive, learner-centred teaching and learning settings” (Unesco 2017). In this context, schools and universities should operate as places of learning and experience for sustainable development, “rethinking the curriculum, campus operations, organizational culture, student participation, leadership and management, community relationships and research,” serving as a role model for the society (Unesco 2017). Therefore, sustainable learning environments (i.e., green campuses and eco-schools) “allow educators and learners to integrate sustainability principles into their daily practices and facilitate capacity-building, competency development and value education in a comprehensive manner” (Unesco 2017).

Universities are town-like institutions, maintaining large facilities, thousands of students, professors, and collaborators, influencing their surrounding communities, therefore having an impact footprint (Klein-Banai and Theis 2011). Considering that their operations exceed the campus and teaching arena, universities must adopt sustainability principles in their campuses’ operations and management activities, also aiming to promote local sustainable development (Berchin et al. 2017; Adom̄bent et al. 2014; Lozano 2006; Lozano et al. 2015b). These operations are related to the campus infrastructure, such as water, energy, wastes, and buildings, but also with the university’s management and institutional agenda and its relations with the internal and external communities, through education, research, and outreach (Lozano et al. 2015b; Guerra et al. 2016; Berchin et al. 2017, 2018).

Incorporating sustainable development in universities, and higher education institutions in general, represents an innovation that should be implemented incrementally in order to avoid barriers, such as resistance to change (Lozano 2006). In this regard, the embedding of sustainability in universities encompasses education, research, and outreach to promote regional sustainable development, stablishing an engagement between

university and society (Lukman et al. 2009; Adom̄bent et al. 2014).

The adoption of sustainability in universities, regarding its three basilar dimensions (social, environmental, and economic), embraces the whole-institution approach to promote capacity, behavioral, and values changes to sustainable development, through the protection of regional natural ecosystems, the use of reusable and recyclable materials and goods, energy efficiency, renewable energy generation, waste management, curricula innovation and adaptation, engagement with stakeholders, and sustainable transportation (Lukman et al. 2009). Based on a sound review of the literature, Berchin et al. (2018) propose a general and holistic structure to implement sustainability in higher education (see Fig. 1).

Focusing on the internal dimensions of university operations for sustainable development, universities should focus on (a) institutional policies, planning, and assessment, (b) education for sustainable development, (c) campus' infrastructure and learning environments, (d) water conservation, (e) energy efficiency and renewable energy generation, (f) waste management, and (g) sustainable transportation policies.

Regarding institutional policies, planning, and assessment, universities should embed sustainability into their vision, mission, goals, and policies to ensure sustainability practices and overcome barriers such as resistance to change, clearly stating the commitment of the institution with sustainable development. Thus, planning for sustainability and promoting the evaluation, assessment, and reporting of these practices are also essential to demonstrate the commitment and performance of the university (Guerra et al. 2016; Berchin et al. 2017, 2018). Sustainability reporting/disclosure is another essential tool to communicate the sustainability initiatives of universities, increasing the awareness about its practices and enabling the evaluation of its performance on sustainability (Ceulemans et al. 2015; Guerra et al. 2016).

Regarding education for sustainable development, universities should embed sustainability in the curricula, both in a transversal manner in all disciplines and in individual/specific courses and

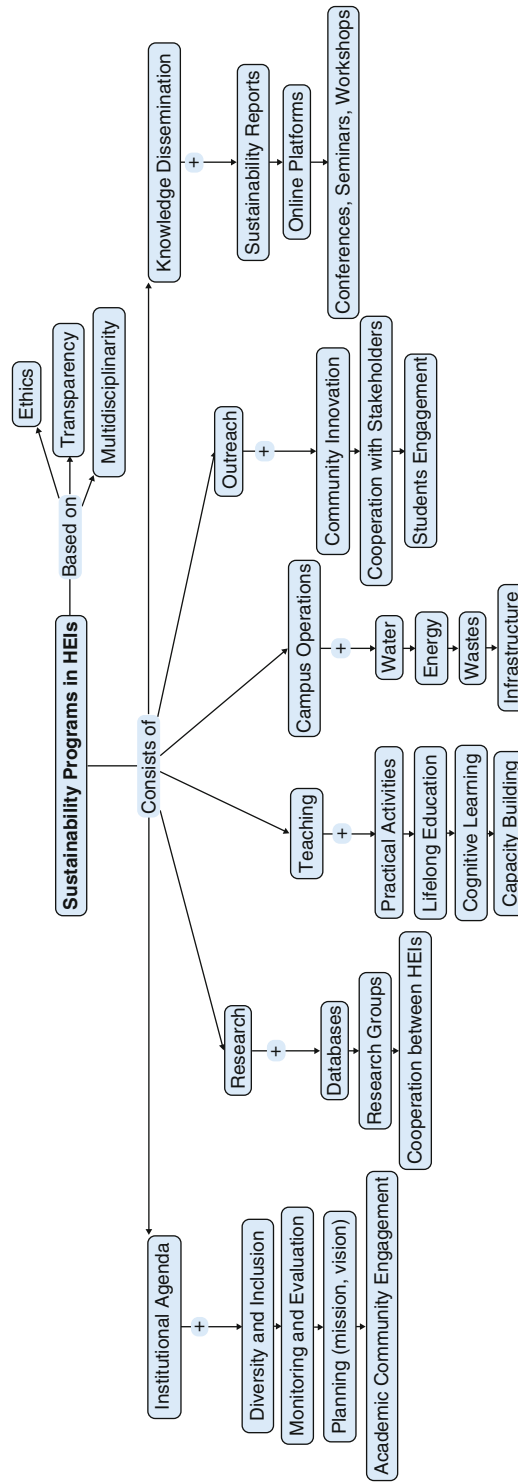
disciplines, also observing interdisciplinary and transdisciplinary approaches. Using innovative approaches, with practical learning, real-life experiences, technologies, outreach, and research, among other innovations to stimulate learning for sustainable development challenges, is also necessary to develop competences, knowledge, and awareness to meet the global challenges (Guerra et al. 2016; Azeiteiro et al. 2015; Berchin et al. 2018).

Regarding campus' infrastructure and learning environments, universities should adopt sustainability criteria when building new infrastructure or reforming the existing ones, also creating learning environments that are environmentally friendly, and reflect best practices of sustainability, enabling students and the community to live sustainably, also inspiring creativity, cooperation, and innovations (Berchin et al. 2017, 2018).

Regarding water conservation, universities should develop strategies and practices to reduce their freshwater consumption, serving as leader of good practices for the society. This could be achieved through efficient piping systems; awareness programs to students, professors, and staff; storage of rainwater; and reuse of wastewater (Guerra et al. 2016; Berchin et al. 2017, 2018).

Regarding energy efficiency and renewable energy generation, universities should implement practices to reduce their energy consumption and generate sustainable electricity, by changing their wire systems, implementing equipment to produce sustainable energy (such as solar energy, bioenergy, wind energy), also serving as a living environment for practical learning, and allowing the academic and the external communities to observe the practices, learn from it, and be aware of it (Guerra et al. 2016; Berchin et al. 2017, 2018).

Regarding waste management, universities should implement programs to reduce waste generation, to increase recycling and reusing, and to use composter to biodegrade organic residues and generate biofertilizer, reducing the environmental footprint of the institution and inspiring the communities (Guerra et al. 2016; Berchin et al. 2017, 2018).



University Operations for Sustainable Development, Fig. 1 Sustainability programs in higher education institutions (Source: Berchin et al. 2018)

Sustainable transportation is also a category of university operations to be considered when planning for sustainable development (Lozano et al. 2015b). Considering that many universities have large facilities and count with thousands of students, professors, and staff, sustainable transportation should be considered to improve the sustainability of the institution, including support to use bicycles, accessible public transportation, and carpooling initiatives (Lozano et al. 2015b; Berchin et al. 2017; Hancock and Nuttman 2014).

Within this proposition, and also focusing on their external operations, universities “should incorporate sustainability into campus operations and systems, representing environments for practical learning, operating as living-labs where students are immersed” (Berchin et al. 2018, p. 759). As living labs, universities operate as a role model of sustainable environment able to embed learners and community members to experience and live sustainability practices, inspiring learning, values, and behavioral changes (Trencher et al. 2013; Evans et al. 2015). Transforming university operations into living labs for sustainable development increases real-life experiences and problem-solving skills and disseminates awareness and knowledge, besides stimulating innovations and collaborations (Cosgrave et al. 2013; Leminen et al. 2012).

In this regard, and considering the central role of universities to promote the necessary innovations for sustainable development, the interaction with external stakeholders is necessary, creating a broad network among university, industry, government, and the civil society with the consideration for the interdependence between our societies and the natural environment; accordingly, knowledge is the main driver of progress (Carayannis et al. 2012; González de la Fe 2009). Therefore, the transformation of university campuses into living labs open to the community, the outreach programs and initiatives, the sustainability reporting practices, and the cooperation with other HEIs and stakeholders all contribute to open the university through their external activities, engaging several actors of our society to create innovations and solutions to the sustainability challenges faced locally and globally.

Engagement, collaboration, and communication among stakeholders are necessary for the development, promotion, and implementation of education and innovations for sustainable development, generating technological, social, and environmental transformations for a sustainable society (Vollenbroek 2002; Von Malmborg 2007). Therefore, innovations for sustainable development are complex, as they address the needs and opinions of various stakeholders in order to reduce environmental and social risks (Hall and Vredenburg 2003; Carayannis et al. 2012). The development of projects with a systemic approach to innovations should engage several stakeholders, inspiring teaching, capacity building, technological development, and dissemination of knowledge and technologies throughout the society (Matos and Silvestre 2013). In order to transform societies toward sustainable development, a multidisciplinary and multi-stakeholder effort is required (Carayannis et al. 2012; Dlouhá et al. 2013; Quist and Tukker 2013).

Nowadays, sustainable development permeates and integrates all levels and sectors of our society, requiring changes in individuals’ attitudes, behaviors, and values, as well as changes toward more collaborative approaches among multiple stakeholders. Accordingly, in the past decades, several international conferences, declarations, and policies urge for universities and educational institutions to lead the way toward sustainable development, generating and disseminating knowledge and innovations, changing learners’ behaviors and values, empowering communities, and developing competences and critical thinking.

Operating with a whole-institution approach through education, research, community outreach, management, and campus, universities promote sustainable development in an inclusive and holistic way, changing themselves to become sustainable learning environments for the students and the communities. Therefore, university operations contribute to sustainable development by developing skills and serving as role model institutions to inspire good practices within the internal community and the surrounding communities. Accordingly, collaborations among universities

and international events enable the sharing of best practices, experiences, and methods used, also enabling a joint effort among universities to find solutions to one's challenges.

Cross-References

- ▶ [Campus Greening and Sustainable Development](#)
- ▶ [Campus Sustainability Policies](#)
- ▶ [Green Campuses and Sustainable Development](#)
- ▶ [Higher Education and Sustainability Initiatives](#)
- ▶ [Sustainability on Campus](#)

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University Outreach

- ▶ [Community Outreach on Sustainability](#)

University's Sustainability Initiatives

- ▶ [Higher Education and Sustainability Initiatives](#)

Use

- ▶ [Reduction in Consumption for Sustainable Development](#)

Utilization

- ▶ [Reduction in Consumption for Sustainable Development](#)