



Sustainable UAO: Paving the Way Forward in the Rise of Sustainability as Institutional Ethos

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Abstract. In response to the pressing global environmental crisis precipitated by the transgression of planetary boundaries due to human activity, the Universidad Autónoma de Occidente (UAO) has made a steadfast commitment to the development of theories, strategies, and practices concerning sustainability since the late 1990s. Through the establishment of both undergraduate and graduate programs, as well as research projects and the Sustainable Campus initiative, UAO has laid the groundwork for national and international recognition in addressing sustainability. Acknowledging the progress made and the historical context, UAO recognizes that the time has come to take a significant quality step towards a more comprehensive and dedicated commitment. This step involves elevating sustainability to the status of institutional ethos. This entails ensuring that the principles of sustainability are prominently and explicitly integrated into the core functions of the university, including teaching, research, and social outreach. This work looks at the journey thus far and, more importantly, charts the course for the future in the elevation of sustainability as institutional ethos. It highlights the key milestones achieved over the past two decades while identifying the most significant challenges and barriers that the university must confront and overcome in the near future to fully embody this ethos. By doing so, UAO aims to realize its ambitious goal of becoming a truly sustainable institution.

Keyword:

Sustainability, Universities role in global sustainability

1. Introduction

Overwhelming and, at the same time, compelling scientific evidence, generated with the utmost rigor in the last two decades, has evidenced the emergence of a new geological era in the Earth System: the Anthropocene (Crutzen, 2002). The term warns how humans have become the primary driving force that determines and regulates the dynamic

processes of the biosphere and biogeochemical cycles. The advent of the Anthropocene represents a real threat to the sustainability of the Earth System, seriously questioning the viability of culture as it has been configured at least since the last glaciation. Indeed, the preceding geological era known as the Holocene was characterized by great climate stability, which precisely allowed the explosion, flourishing, and expansion of humans in countless ecosystems of the Earth System. The Holocene is temporally situated between about 11,000 and 12,000 years ago, its main feature being minimal variations in the Earth's average temperature, which resulted in the mentioned climate stability. Given these conditions, the Holocene is the only state of the Earth System, from which we have evidence, that can support the current social, economic, and cultural activities of humans.

In contrast, and despite the above, the so-called Great Acceleration (Steffen et al., 2015), a child of modernity and its development worldview, and originated after World War II, caused an enormous anthropic pressure that seems to have surpassed the system's carrying capacity, expressed in terms of the so-called planetary boundaries (Rockström et al., 2009), thus welcoming the Anthropocene and raising the alarms of a planetary crisis. In other words, the emergence of the Anthropocene has led the Earth System to abandon the mentioned stability conditions of the Holocene towards a new era of high uncertainty and high risk, whose first manifestations have already become evident in all latitudes. It can be deduced then that the great challenge humanity faces in this century is to steer the Anthropocene in such a way that the planetary stability conditions of the Holocene are maintained as much as possible. If so, it could be said that humanity has managed to build a sustainable Anthropocene.

The University has known how to respond to these challenges, and it is thus that since the 1990s, following the recommendations of the 1992 Earth Summit, it has interpreted the challenge that sustainability represents into concrete proposals that have materialized through the exercise of its substantive functions: undergraduate and postgraduate programs have contributed to the formation of human capital at all levels; various research groups have generated new knowledge with an interdisciplinary approach that has allowed addressing the issue in all its complexity; in a good number of social outreach initiatives, it has managed to intervene in the transition towards sustainability of community and business environments, as well as public sector domains. Additionally, in this commitment to sustainability, the Sustainable Campus program has played a leading role, making the operation of the university campus a scenario of concrete practice of the guiding principles of sustainability, thus highlighting university social responsibility and institutional coherence.

In the face of the planetary crisis and recognizing the University's trajectory around sustainability and the corresponding national and regional recognition it has deserved, it is legitimate to critically ask at this moment in the Institution: Is UAO a truly sustainable university? What does it mean for the University to declare itself a sustainable university? In addressing these questions, the proposal called Sustainable UAO arises, aiming to transform the entire university's operations towards the superior goal of Earth System sustainability. Sustainable UAO is a future-oriented initiative for the University's development that stems, on the one hand, from a serious and responsible reading of the risk to the functioning of the biosphere that the Anthropocene configures; and on the other hand, from the intention to strengthen and project a clear institutional distinctive and differentiator. Sustainable UAO then proposes the ambitious goal of elevating sustainability to the rank of institutional ethos. This means, with all the weight that it entails, that all the

university's actions in the deployment of its substantive functions must necessarily reflect a UAO stamp of sustainability.

This UAO stamp of sustainability represents a daunting task to tackle, encompassing two levels. First, the conceptual development of it; and second, the design and implementation of specific strategies through which the UAO sustainability stamp is "imprinted" in the exercise of the substantive functions.

The Universidad Autónoma de Occidente (UAO) has implemented a series of sustainability practices that underscore its commitment to integrating sustainability across its core functions. These initiatives are guided by four strategic sustainability goals: achieving a carbon-neutral campus, developing a circular campus, transitioning to near-zero energy buildings, and becoming a smart campus. The Sustainable Campus initiative serves as a comprehensive strategy to reach these goals, focusing on reducing the environmental impact of campus operations through energy efficiency, water conservation, and waste management programs. The university has also established the Sustainability Institute, which drives interdisciplinary research and educational programs centred on sustainable development. UAO has incorporated sustainability into its curriculum by embedding sustainability-related competencies in its academic programs, fostering a holistic understanding of environmental and social issues among students. Additionally, the university has undertaken a participatory pre-dial diagnostic workshop, aimed at designing a sustainability laboratory to integrate research, teaching, and community engagement. These actions, alongside ongoing collaborations and research projects, are paving the way for UAO to become a leading institution in sustainability, both regionally and internationally, while exemplifying how universities can play a crucial role in advancing sustainable practices in their communities and beyond.

This paper examines the journey of UAO in embedding sustainability into its institutional framework, showcasing the key milestones achieved and highlighting the future steps required to solidify sustainability as an institutional ethos. It aims to provide an in-depth understanding of UAO's sustainability practices at the university level and their contribution to regional and global sustainability goals. By doing so, UAO aspires to set a precedent for other institutions aiming to integrate sustainability as a central tenet of their organizational culture, the ethos.

2. Theoretical Approach and Methodology

The global threat to the sustainability of the Earth System seriously questions the viability of culture as it has been configured at least since the last glaciation (Biermann, 2020). Indeed, the last geological era known as the Holocene was characterized by great climate stability, which precisely allowed the explosion, flourishing, and expansion of culture in countless ecosystems of the Earth System (Folke et al., 2011). However, the so-called Great Acceleration (Steffen et al., 2015), a product of modernity and its development worldview, and originating after World War II, caused an enormous anthropic pressure that seems to have exceeded the system's carrying capacity, expressed in terms of the so-called planetary boundaries (Rockström et al., 2009; Crutzen, 2002). Certainly, the planetary boundaries, which include climate change, biosphere integrity, the biogeochemical cycles of nitrogen and phosphorus, the rate of freshwater exploitation, and the ozone layer, represent the system's carrying capacity and indicate the risks the system would face if these boundaries were exceeded (Biermann, 2020; Folke et al., 2011). It is thus possible to express the sustainability of the Earth System, defined as a closed system that only allows energy

exchange with its environment, in terms of planetary boundaries: as long as the system operates within these boundaries, it is considered sustainable since it would be able to perform its functions over time, given that the closed system has an external energy source (the sun). Conversely, if the boundaries are exceeded, the system's sustainability would be compromised as some of its functions would be impaired or diminished (Boulding, 1966; Lineweaver & Egan, 2008).

It is important to clarify that in terms of sustainability, the thermodynamic equilibrium of a system corresponds to its state of maximum entropy, a state in which no function is possible since there is no gradient to allow flows of matter and energy and, therefore, no free energy available to do work. Thermodynamic equilibrium thus implies the end term for a system's functioning. Conversely, from this general trend of the universe, sustainability can be defined as an emergent property of systems to remain far from thermodynamic equilibrium, a condition that is only possible if the system has an external energy source, so it can compensate for the inherent internal generation of entropy (Lineweaver & Egan, 2008). This implies that sustainability is fundamentally a matter of entropy: systems that can compensate for the internal generation of entropy through an external energy source can be considered sustainable, and vice versa, systems whose internal generation of entropy exceeds the free energy flow from the external energy source are doomed to gradually approach thermodynamic equilibrium and, therefore, can be considered unsustainable.

From this perspective, regarding the Earth System, it can be stated that during the Holocene, both the biogeochemical cycles and other fundamental functions were carried out without transgressing the planetary boundaries (Rockström et al., 2009). This led to the internal generation of entropy being compensated by solar radiation (free energy available to do work) as an external energy source. In other words, the Earth System in the Holocene was sustainable since it remained far from thermodynamic equilibrium. These conditions were favourable for the final adaptation of humans and their expansion across a significant part of the system. With the recent emergence of the Anthropocene, the sustainability condition of the Earth System was affected. Due to direct anthropic action, and in an extremely short time, several planetary boundaries have been exceeded. Indeed, the Great Acceleration has resulted in the surpassing of the exploitation limits of the biogeochemical cycles of nitrogen and phosphorus, biosphere integrity, and naturally, climate change. The latter is likely the most well-known of the planetary boundaries and has received the most media attention due to the severity of its consequences on the entire biosphere, including the economic subsystem (Crutzen, 2002; Steffen et al., 2015). All of this indicates that the Earth System is generating more internal entropy than it can compensate for through solar radiation, and therefore, it has begun to approach thermodynamic equilibrium. That is to say, the system in the Anthropocene is no longer sustainable.

This thermodynamic approach to sustainability was masterfully outlined, due to its simplicity and clarity, by the economist Kenneth Boulding in his famous essay titled "The Economics of the Coming Spaceship Earth" from 1966. It is worth noting that although Boulding never referred to the term "sustainability," he definitively established the profound relationship between sustainability and the Second Law of Thermodynamics. According to Boulding, the linear economy or cowboy economy is one that does not recognize the physical limits of the system that supports it, while the closed economy or astronaut economy is one that recognizes the finiteness of the system and focuses on closing cycles to ensure its functioning over time. From these images, Boulding conclusively states that the economy of the Earth System resembles the astronaut economy, although at least

since the industrial revolution, the cowboy economy paradigm has prevailed. The Anthropocene is a consequence of managing the world economy as a cowboy economy, when in fact the Earth System functions like a spaceship, with finite and limited resources (Biermann, 2020).

More than 50 years have passed since then, and as a consequence of the proliferation of contexts in which the term has been used, as well as the many meanings that have been intended to denote with it, the concept of sustainability has precipitated into an overflowing polysemy that has ended up emptying its essence, fragmenting its systemic complexity into mere myopic and isolated fiefdoms (i.e., environmental, social, economic, cultural, political sustainability); and finally encouraging the indiscriminate and even pernicious use of the adjective “sustainable.” In the meantime, the Earth System experienced the emergence of a new geological era: the Anthropocene. For the first time in the long evolutionary history of the system, a species has become the main driving force that propels and guides the transformative dynamics of its functioning. These dynamics have been determined by the so-called Great Acceleration, whose most notable and concerning consequence is the transgression of some planetary boundaries (Steffen et al., 2015). In the face of this new scenario that the Anthropocene represents, the sustainability of spaceship Earth, regardless of adjectives, will depend on the astronaut's ability to operate the system within its natural safety zone.

It can be concluded in this section that given the current situation of the Earth System and the real threat that the Anthropocene represents, the study object of the IEPS, aligning with it, must be the sustainability of the Earth System in the Anthropocene. Reflection around this study object should then lead to a contribution from UAO to one of the most significant developments of the moment: a Theory of Sustainability.

2.1. What are the Conditions and Determinants for a Sustainable University?

As a starting point in the search for minimum agreements on sustainability, the idea of sustainability without adjectives is proposed (Blewitt, 2015; Lozano, 2006). The conceptual development of sustainability without adjectives is suggested as a challenge for the IEPS that could potentially be configured as the UAO sustainability stamp. From this conceptual development, methodological approaches and concrete applications should be advanced to guide the UA in pointing out pathways to transition towards a good Anthropocene, establishing itself as a leading university in sustainability, that is, a leader and reference in the transition process towards a good Anthropocene (Barnett et al., 2020; Leal Filho et al., 2018). The institute, then, from its totalizing approach to sustainability (sustainability without adjectives), should strive for an ultimate purpose in all its activities: a sustainable Anthropocene. This transition towards a good Anthropocene should be framed within what some authors have called the Great Ambition (Sanders et al., 2018), which consists of ensuring progress in achieving the SDGs without transgressing the safety thresholds of the planetary boundaries, safeguarding the stability and resilience of the Earth System. This Great Ambition is graphically represented in Figure 1. From this perspective of sustainability without adjectives, the following questions arise:

- How does UAO contribute to sustainability?
- What is the UAO's path to sustainability in the Anthropocene?

The answers to these questions must be formulated based on the university's substantive functions. Therefore:

- How to imprint the UAO sustainability stamp in the Anthropocene on undergraduate and graduate academic programs?

- Is it possible to orient the Program Educational Projects (PEPs) towards sustainability in the Anthropocene, and thus permeate the curricula?
- How to imprint the UAO sustainability stamp in the Anthropocene on research, entrepreneurship, and innovation?
- How to transition towards research groups and lines oriented towards sustainability in the Anthropocene?
- How to transition towards Innovation for sustainability in the Anthropocene?
- How to transition towards entrepreneurship focused on sustainability?
- How to imprint the UAO sustainability stamp on social outreach?
- How to transition towards social outreach and extension for sustainability in the Anthropocene?

Based on the previously mentioned literature review on the strategies and approaches through which universities have addressed the issue of sustainability and have concretized their contributions to this global purpose, two minimum conditions can be identified for a university to be considered sustainable (Sterling, 2011):

Condition 1: The sustainability of the Earth System as a global purpose in the Anthropocene era is a substantial part of the university's ideology and the Institutional Educational Project (IEP).

Condition 2: The university, in its operation, maximizes socio-environmental benefits within its sphere of action and prevents, mitigates, and controls adverse effects on the Earth System that may result from its activities.

The first condition explicitly refers to the alignment of substantive functions with the global purpose of sustainability:

Teaching: Training human resources at all levels to face the challenge of sustainability in the Anthropocene.

Research: Generating new knowledge to tackle the sustainability challenge in the Anthropocene.

Social Outreach: Interventions in its area of influence that contribute to regional sustainability.

Regarding the second condition, it should be stated that the operation of a university committed to sustainability is above all a matter of coherence, commitment, and social responsibility (Cortese, 2003). The operation of a university campus is the best opportunity to put into concrete practice solutions and alternatives that contribute to sustainability. Among the different components of the operation of a university campus, the following can be mentioned: Energy management, Water management, Air quality management, Solid waste management, Emissions control and carbon footprint, Buildings, Transportation, Protective zones, Biodiversity management (Leal Filho et al., 2019).

To further contextualize the analysis, it is crucial to review specific sustainability practices implemented at leading universities that serve as benchmarks in the field. Institutions such as Stanford University, the University of British Columbia, and the University of Tokyo have embraced sustainability as an integral part of their operational and academic strategies. For instance, Stanford University established the Stanford Energy System Innovations (SESI) project, which has reduced campus greenhouse gas emissions by 68% since 2015 through a state-of-the-art heat recovery system and extensive use of renewable energy sources (Stanford University, 2023). Similarly, the University of British Columbia's UBC Sustainability Initiative integrates sustainability into teaching, research, and community engagement through the Campus as a Living Laboratory project, enabling the

campus to function as a testbed for sustainable technologies and approaches (University of British Columbia, 2023). Additionally, the University of Tokyo has introduced the UTokyo Sustainability Project, which emphasizes energy-efficient building designs, biodiversity conservation, and sustainable urban development practices on campus (University of Tokyo, 2022). These initiatives demonstrate how sustainability can be deeply embedded into university systems, leveraging campus resources to address both local and global environmental challenges while creating transformative educational experiences for students.

Building upon these examples, the Universidad Autónoma de Occidente (UAO) positions itself as a leading institution in sustainability within the Latin American region through innovative projects and the establishment of strategic goals such as becoming a carbon-neutral, circular, near-zero energy, and smart campus. UAO's efforts parallel those of other prestigious institutions by promoting energy-efficient infrastructure, implementing waste management programs, and integrating sustainability into the curriculum across undergraduate and graduate levels. Moreover, UAO's participatory diagnostic workshops, which involve the academic community in designing sustainability initiatives, are a novel approach to fostering a sense of collective responsibility. By embedding these practices into its institutional ethos, UAO not only contributes to the development of sustainable campuses but also strengthens its role in promoting regional sustainability solutions. This positioning allows UAO to stand out among global peers, highlighting its potential to influence sustainability practices in higher education.

The research presented in this article was carried out using a highly participatory approach, ensuring the inclusion of all university stakeholders, such as academic units, administrative departments, students, teachers, and professors. This participatory methodology was designed to guarantee that the sustainability strategy and practices at the Universidad Autónoma de Occidente (UAO) truly reflect the perspectives and expectations of the entire university community. The research process began with the establishment of a series of workshops and focus groups that allowed representatives from all university dependencies to actively contribute to defining sustainability goals and strategies. The Sustainability Institute facilitated these sessions, ensuring that all voices were heard and that the discussions addressed relevant topics such as sustainability in teaching, research, community engagement, and campus operations. This collaborative dialogue enabled the identification of strengths, opportunities, and areas for improvement, and laid the foundation for integrating sustainability into the institutional ethos of the university.

In addition to workshops and focus groups, the research also included a comprehensive survey directed at all members of the university community, which aimed to gather quantitative data on perceptions, knowledge, and attitudes towards sustainability. This survey was essential for understanding the level of awareness and engagement of students, faculty, and administrative staff with sustainability practices. The survey results provided valuable insights that were used to develop the sustainability indicators and metrics presented in the document. Furthermore, a participatory diagnostic workshop was conducted as part of the design of the UAO Sustainability Laboratory, focusing on identifying the environmental, social, and technological characteristics of the university's physical spaces. This methodology ensured that all strategic decisions were based on a comprehensive understanding of the needs and expectations of the community, ultimately reinforcing UAO's commitment to a sustainability framework that is co-created and implemented by the entire institution.

3. Discussions and Implementation

At UAO, institutional commitment to sustainability already has a significant trajectory. The coherence between discourse and practice for this global purpose is concretized through the university's substantive functions: in classrooms, in the generation of new knowledge, and in the implementation of transformative initiatives in local and regional contexts. In this sense, the institutional commitment and coherence are materialized in the Sustainable Campus Program, led by the Vice-Rector of Research, Innovation, and Entrepreneurship, understood as a living laboratory and a platform from which specific sustainable practices are deployed, aiming to connect actors and weave convergences, thus indicating a concrete direction for the transition towards a good Anthropocene.

All this allows us to build a UAO vision attuned to the reality of the Anthropocene and the unavoidable urgency of sustainability. The metaphor of the spaceship as an ideal model of sustainability faithfully reflects the spirit and ultimate purpose of the institutional efforts, giving rise to the vision of the UAO spaceship, which recognizes the fragility of the system in terms of its entropic limits (Leff, 2018), the reciprocity of the environmental crisis with contemporary socio-economic crises (Pope Francis, 2015), and the global agreement around the Sustainable Development Goals (SDGs).

The vision of the UAO spaceship as a platform for transformation towards a good Anthropocene can be synthesized in the following normative criterion: advancing in the achievement of the SDGs without transgressing the safety thresholds of the planetary boundaries. This, and no other, is the challenge we have at hand. As astronauts of spaceship Earth, if we manage to achieve the different goals contemplated in the SDGs in the medium term and, simultaneously, do not exceed the planetary boundaries in our attempt, we would then be driving the system towards the emergent property of sustainability, without any adjective.

Regarding the first level, the starting point is the recognition that the sustainability of the Earth System in the Anthropocene presupposes a new totalizing, systemic, and complex approach. Considering that in recent decades, due to the proliferation of contexts in which the term 'sustainability' has been used, as well as the many meanings that have been intended to denote with it, the concept of sustainability has precipitated into an overflowing polysemy that has ended up emptying its essence, fragmenting its systemic complexity into mere myopic and isolated fiefdoms (i.e., environmental, social, economic, cultural, political sustainability). This has ultimately led to the indiscriminate and even pernicious use of the adjective "sustainable". In contrast, from the proposed perspective, the UAO sustainability stamp should aim for a totalizing concept where adjectives would not only be unnecessary but even distort the strict sense of the term.

Thus, sustainability without adjectives is proposed as the UAO sustainability stamp, as a challenge that enhances and guides the University's growth. The institutional stamp of sustainability without adjectives presupposes, of course, a conceptual effort, as well as developments in methodological approaches and concrete applications that lead to "imprinting" this stamp in the exercise of the substantive functions. From sustainability without adjectives, the University will be able to point out paths to navigate towards a good Anthropocene, establishing itself as a leading and reference university in this transition process. This transition towards a good Anthropocene should be framed within what some authors have called the Great Ambition (Sanders et al., 2018), which consists of ensuring progress in meeting the Sustainable Development Goals without transgressing the safety thresholds of the planetary boundaries, safeguarding the stability and resilience of the Earth

System (Figure 1).

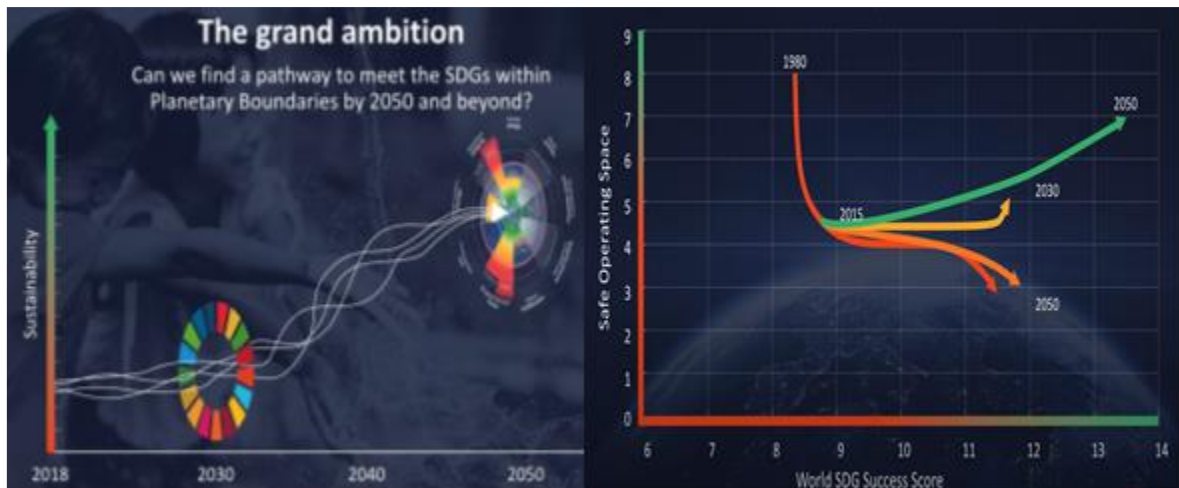


Figure 1. The Great Ambition: Achieving the SDGs within Planetary Boundaries

The institutional stamp of sustainability without adjectives must be "imprinted" on the actions of UAO in all its operational dimensions, based on the declared criterion of the Great Ambition: to contribute to achieving the SDGs within the framework of the Earth's System's operational safety conditions.

Now, concerning the second level, sustainability as an institutional ethos and the UAO sustainability stamp as a concrete imprint of this decision requires tuning the University's declarations, purposes, policies, and plans. Therefore, it is necessary to rethink the institutional ideology to respond to this new directive. From the Institutional Educational Project (IEP), through the guidance of the Institutional Development Plan (IDP), and reaching the Program Educational Projects (PEPs), as well as in research and social outreach policies and programs, sustainability as an institutional ethos must be testified to and, above all, the architecture must be designed and implemented to stamp the imprint of sustainability without adjectives in the deployment of the substantive functions.

A starting point to expedite the process of institutional updating and tuning towards Sustainable UAO corresponds to the inclusion of a new strategic direction within the current Institutional Development Plan (IDP 2020-2030), titled Sustainability and Society Building. From its title, this strategic direction faithfully reflects this purpose: on one hand, it explicitly mentions sustainability as a substantive element for institutional development, and on the other, it refers to society building, which is undoubtedly the essential element for a sustainable Anthropocene. As mentioned, since human activity is the main driving force in the dynamics of the Earth System, only through the construction of a new society will it be possible to transition towards an Anthropocene where the Great Ambition is achievable.

In total concordance with the above, the strategic direction of Sustainability and Society Building has as its general objective "to consolidate UAO as an institutional ecosystem that contributes to society building with a global sustainability approach. Within the University, the internal and external community can find a platform for building an open, creative, and respectful society in coherence with the Sustainable Development Goals (SDGs) and planetary boundaries." To achieve this objective, three lines of action are proposed: i. UAO as a promoter and reference in Sustainability; ii. UAO as a space for research, creation, and innovation; and iii. UAO as an urban-regional and social laboratory. While the first line of

action strongly underlines the institutional commitment to the Great Ambition, the second privileges the University as a space for generating new knowledge, as well as for creation and innovation from which new approaches, methodologies, and strategies for this great purpose can be generated. The third line of action rightly indicates the great potential of the University and its campus as an urban-regional laboratory to test and experiment with the aspects mentioned in the second line of action, contributing to the social transformation that planetary sustainability in terms of the Great Ambition demands.

The third line of action of the mentioned Strategic Direction leads to a final element that should play a leading role in the construction of Sustainable UAO: the Sustainability Laboratory, understood as a broad concept where the university campus is seen as a large living laboratory to create, experiment, innovate, and implement methodologies, approaches, and technologies that decisively contribute to a sustainable Anthropocene. Following the path traced by the Sustainable Campus program in all its phases and the current Campus Lab program, the Sustainability Laboratory is projected as a first-priority need since it will allow the convergence and dialogue of knowledge between teaching, research, and social outreach with the operation of the university campus. The Sustainability Laboratory will also require physical spaces and specific infrastructure where the mentioned experimental elements can be materialized, allowing the achievement of the four proposed goals for the UAO sustainable campus: carbon-neutral campus, circular campus, near-zero energy campus, and connected and intelligent campus.

Additionally, from the Sustainability Laboratory and its associated infrastructure, a layer oriented towards green business entrepreneurship can be perfectly activated. The developments achieved in the four goals mentioned above even currently enable the commercialization of products and services with the Sustainable UAO stamp. Scaling up the current results to a much broader and more complete infrastructure in the Sustainability Laboratory, it would be feasible to offer a dynamic portfolio of green businesses with the real potential to generate new income for the Institution that could be invested in the Sustainable UAO strategies.

Thus, the Sustainability Laboratory (LIS), understood as a broad concept in which the university campus is seen as a large living laboratory to create, experiment, innovate, and implement methodologies, approaches, and technologies that decisively contribute towards a sustainable Anthropocene. Following the path traced by the Sustainable Campus program in all its phases and the current Campus Lab program, the Sustainability Laboratory is projected as a first priority need, as it will allow the convergence and dialogue of knowledge between teaching, research, and social outreach with the operation of the university campus. The Integrated Sustainability Laboratory will also require physical spaces and specific infrastructure where the mentioned experimental elements can be materialized. Additionally, from the Sustainability Laboratory and its associated infrastructure, a layer oriented towards green business entrepreneurship can be perfectly activated. The developments achieved so far in the four goals mentioned in the previous paragraph enable, even at this moment, the commercialization of products and services with the UAO Sustainable stamp. By scaling up the current results to a much broader and complete infrastructure in the Sustainability Laboratory, it would be feasible to offer a dynamic portfolio of green businesses with the real potential to generate new income for the Institution that could be invested in UAO Sustainable strategies.

The LIS should then contribute significantly to the university's substantive functions and, at the same time, assist in the sustainable operation of the campus. Additionally, it is

feasible to consider activating a commercialization layer of products and services, possibly through Spin Off companies. The figure schematizes the function of the LIS within the framework of UAO Sustainable and its main components.

Figure 2, on the other hand, shows how the UAO sustainability stamp must be "imprinted" starting from the Institutional Educational Project (IEP) as the guiding document of all university activities and permeating from there through all operational levels of the university in its substantive functions. Based on the guidelines presented here, it can be concluded that Sustainable UAO represents a future-oriented initiative for the University, with various time horizons, that, if implemented, will lead sustainability to become an institutional ethos. In turn, the UAO Sustainable stamp, derived from the above, understood as sustainability without adjectives, can be recognized as a brand, a real differentiator, and a generator of added and differential value for the Institution.

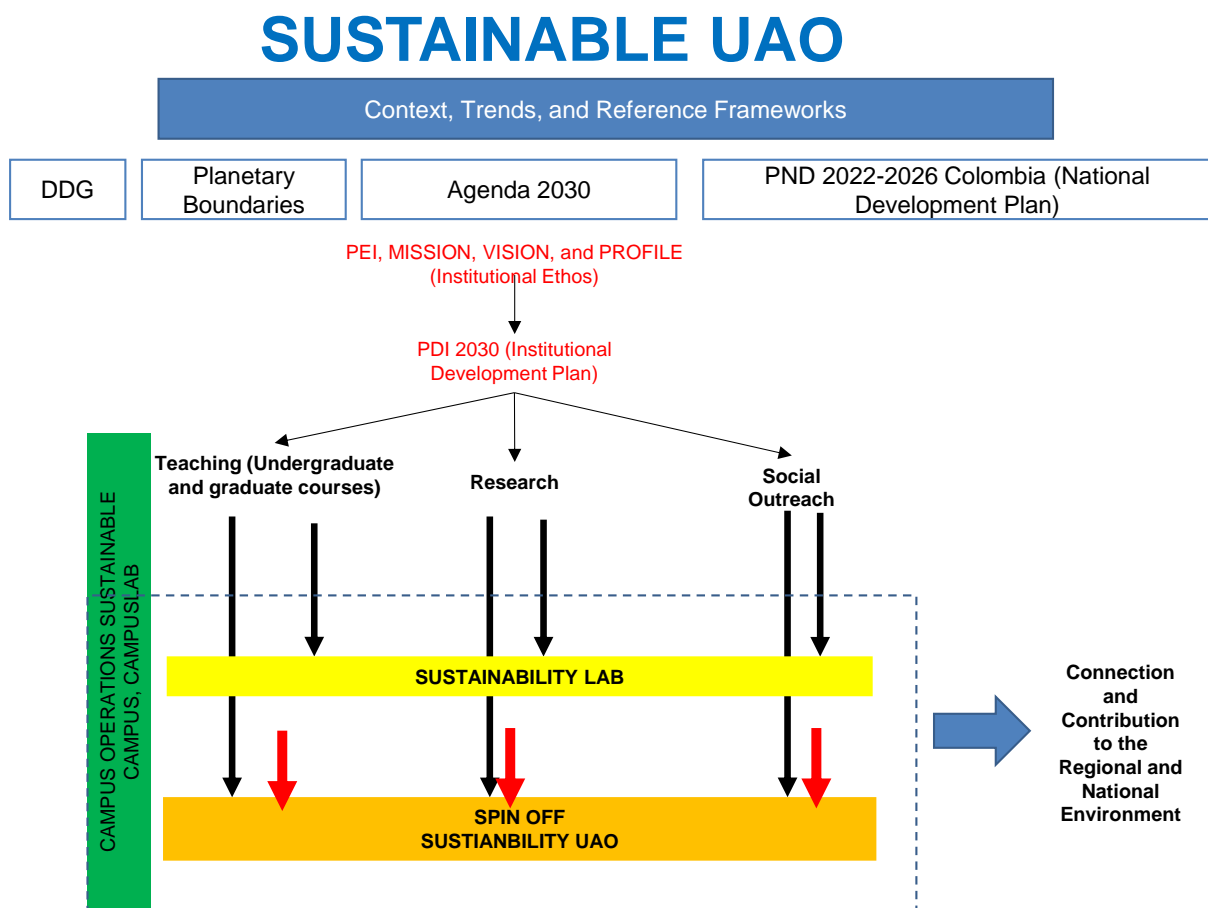


Figure 2. Sustainability in the Core Functions of the University

The transition towards innovation for sustainability in the Anthropocene, as proposed in this research, requires rethinking the role of universities as active agents in generating new knowledge and developing transformative solutions that address both local and global sustainability challenges. UAO's approach is centred on the concept of sustainability without adjectives, which is presented as a key strategy for reaching sustainability in the Anthropocene by transcending traditional fragmented views (environmental, social, economic) and instead promoting a holistic perspective that integrates systemic and complex thinking. This approach is operationalized through the Institutional Sustainability Laboratory (LIS), a key initiative that leverages the campus as a living laboratory where

teaching, research, and community outreach converge to experiment with and implement methodologies, strategies, and technologies aligned with the Sustainable Development Goals (SDGs) and the boundaries of the Earth System.

The LIS serves as the platform for innovation by encouraging interdisciplinary collaboration and providing physical spaces and infrastructure to develop prototypes, pilot projects, and green business initiatives. The Sustainability Laboratory integrates sustainable practices into the university's operations and academic programs, facilitating research that directly contributes to transitioning towards a sustainable Anthropocene. It allows the creation of new solutions through research, the development of green technologies, and the generation of knowledge in partnership with external stakeholders, thereby promoting entrepreneurship and innovation focused on sustainability.

Furthermore, the LIS aligns with UAO's strategic goal of establishing itself as a carbon-neutral, circular, near-zero energy, and intelligent campus. Through these targeted goals, the university can advance innovation for sustainability by exploring and implementing advanced technological solutions, promoting the circular economy, and fostering sustainable business models. This research highlights the importance of embedding innovation in all university activities to support the transition to sustainability in the Anthropocene. The concept of sustainability without adjectives thus serves as a guiding principle, creating a cohesive and integrated framework that enables UAO to lead in sustainability research, innovation, and practice, answering the research question by detailing how the LIS and the sustainability ethos of UAO create a conducive environment for innovation and experimentation aimed at achieving a sustainable future.

4. Conclusions and Future Perspectives

Based on the guidelines presented here, it can be concluded that UAO Sustainable represents a future-oriented commitment for the University, with various time horizons. If implemented, this will lead to sustainability becoming the institutional ethos. Consequently, the UAO Sustainable hallmark, derived from this commitment and understood as sustainability without adjectives, can be recognized as a brand, a real differentiator, and a generator of added and differential value for the Institution. The UAO has made significant strides in embedding sustainability into its institutional framework. Over the past two decades, UAO has transitioned from merely responding to global environmental challenges to positioning sustainability as a core element of its ethos. This journey reflects the university's recognition of the critical role it plays in fostering a sustainable future amidst the Anthropocene era. The initiative to establish a Sustainable UAO represents a profound commitment to integrating sustainability into all facets of university operations. This involves not only academic programs but also research, social outreach, and the physical operation of the campus itself. The concept of sustainability without adjectives emphasizes a holistic approach, moving beyond fragmented notions of environmental, social, or economic sustainability to a comprehensive understanding that permeates all institutional activities. Key milestones achieved include the development of sustainability-focused undergraduate and graduate programs, the creation of interdisciplinary research groups, and the implementation of the Sustainable Campus program. These initiatives have not only garnered national and international recognition but have also provided a solid foundation for future endeavours.

4.1. Future Perspectives

Looking ahead, the Sustainable UAO initiative outlines an ambitious path for further embedding sustainability into the university's DNA. This vision aligns with global sustainability goals, particularly the Sustainable Development Goals (SDGs), while adhering to the planetary boundaries framework to ensure the long-term viability of the Earth System.

- **Advancing the Sustainability Stamp:** the future of UAO's sustainability efforts hinges on the successful implementation of the UAO sustainability stamp. This stamp, representing sustainability without adjectives, must be consistently applied across all university operations. This includes curriculum development, research agendas, and community engagement projects. The aim is to create a distinctive and recognizable brand that signifies UAO's commitment to sustainability.
- **Strengthening Institutional Frameworks:** to achieve this, UAO needs to revisit and potentially revise its Institutional Educational Project (IEP), Institutional Development Plan (IDP), and Program Educational Projects (PEPs). These frameworks should explicitly incorporate sustainability principles, ensuring that every aspect of university life is aligned with the goal of a sustainable Anthropocene.
- **Enhancing Research and Innovation:** research and innovation will continue to play a pivotal role in UAO's sustainability journey. Future efforts should focus on developing new methodologies and technologies that support sustainable practices. The establishment of the Sustainability Laboratory will be critical in this regard. This lab will serve as a hub for interdisciplinary research, fostering collaboration between different academic disciplines and external partners.
- **Expanding Social Outreach:** UAO's commitment to sustainability must extend beyond the campus. Future initiatives should aim to enhance the university's engagement with local communities, businesses, and public sector entities. By acting as a catalyst for sustainable practices in the wider community, UAO can amplify its impact and contribute to regional and national sustainability goals.
- **Achieving the Great Ambition:** ultimately, UAO's sustainability efforts should be guided by the concept of the Great Ambition. This entails making progress toward the SDGs without transgressing planetary boundaries. Achieving this balance will require a nuanced and flexible approach, capable of adapting to emerging challenges and opportunities.
- **Institutionalizing Sustainability:** for sustainability to become truly embedded in UAO's ethos, it must be institutionalized at every level. This includes integrating sustainability into the university's governance structures, ensuring that decision-making processes prioritize long-term environmental and social impacts.
- **Building a Green Economy:** UAO has the potential to foster green entrepreneurship and innovation. The Sustainability Laboratory can serve as an incubator for sustainable businesses, offering support for the development and commercialization of green technologies. This can create new revenue streams for the university while contributing to broader economic sustainability.

In conclusion, the future of UAO as a sustainable university hinges on its ability to fully integrate sustainability into its institutional fabric. By adhering to the principles of sustainability without adjectives, UAO can become a leader in the transition toward a sustainable Anthropocene, setting an example for other institutions and contributing significantly to global sustainability efforts.

References

1. Barnett, R., & Jackson, N. (2020). *Sustainability in Higher Education: Perspectives and Practices*. Routledge.
2. Biermann, F. (2020). The Future of 'Planetary Boundaries': Earth System Governance, International Law and Democracy. *Earth System Governance*, 4, 100049.
3. Blewitt, J. (2015). *Understanding Sustainable Development*. Routledge.
4. Boulding, K. (1966). The Economics of the Coming Spaceship Earth. In: *Environmental Quality in a Growing Economy*. Resources for the Future.
5. Cortese, A. D. (2003). The Critical Role of Higher Education in Creating a Sustainable Future. *Planning for Higher Education*, 31(3), 15-22.
6. Crutzen, P. Geology of mankind. *Nature* 415, 23 (2002)
7. Folke, C., Jansson, Å., Rockström, J., Olsson, P., Carpenter, S. R., Chapin, F. S., & Steffen, W. (2011). Reconnecting to the Biosphere. *Ambio*, 40(7), 719-738.
8. Leal Filho, W., Shiel, C., & Paço, A. (2016). Implementing and Operationalising Integrative Approaches to Sustainability in Higher Education: The Role of Project-Oriented Learning. *Journal of Cleaner Production*, 133, 126-135.
9. Leal Filho, W., Vargas, V. R., Salvia, A. L., & Brandli, L. L. (2019). *Sustainability and the Higher Education Institutions: Integrating Sustainability in Business, Arts, and Humanities*. Springer International Publishing.
10. Lozano, R. (2006). Incorporation and Institutionalization of SD into Universities: Breaking Through Barriers to Change. *Journal of Cleaner Production*, 14(9-11), 787-796.
11. Rockström, J., Steffen, W., Noone, K., Persson, Å., Chapin III, F. S., Lambin, E., ... & Foley, J. (2009). Planetary boundaries: exploring the safe operating space for humanity. *Ecology and society*, 14(2).
12. Sanders, M., Heldeweg, M., & Verschoor, M. (2018). *Towards a Good Anthropocene: The Transition to a Sustainable Society*. Springer.
13. Sanders, J., Rockstrom, J., & Stoknes, P. E. (2018). *Transformation is feasible: How to achieve the sustainable development goals within planetary boundaries*. Stockholm Resilience Centre.
14. Stanford University. (2023). *Stanford Energy System Innovations (SESI)*. Retrieved from <https://sustainable.stanford.edu>

15. Steffen, W., Broadgate, W., Deutsch, L., Gaffney, O., & Ludwig, C. (2015). The Trajectory of the Anthropocene: The Great Acceleration. *The Anthropocene Review*, 2(1), 81-98.
16. Steffen, W., Richardson, K., Rockström, J., Cornell, S. E., Fetzer, I., Bennett, E. M., ... & Sörlin, S. (2015). Planetary boundaries: Guiding human development on a changing planet. *science*, 347(6223), 1259855.
17. Sterling, S. (2011). *Sustainable Education: Re-Visioning Learning and Change*. Green Books.
18. University of British Columbia. (2023). UBC Sustainability Initiative. Retrieved from <https://sustain.ubc.ca>
19. University of Tokyo. (2022). UTokyo Sustainability Project. Retrieved from <https://www.sustainability.u-tokyo.ac.jp/en>



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