

# Pursuing Sustainable Development Across Disciplines



Walter Leal Filho

**Abstract** This final chapter explores some of the means which may be deployed to pursue and implement sustainable development across disciplines.

**Keywords** Sustainable development · Disciplines · Methods · Interdisciplinary · Future

## 1 Introduction

Since the establishment of the Sustainable Development Goals, a concerted global effort has been made to incorporate sustainability into activities across all sectors. This is also seen in the education sector, where multidisciplinary activities are being carried out to ensure the SDGs are achieved. Currently, this is observed through both, education for sustainable development and in the general operations of institutions as a whole, and in specific faculties in particular (Lovren 2015).

As far as the education sector is concerned, universities have the power to cover some key areas, such as curriculum greening, research, campus operations, and community engagement. In terms of education, the goal is to introduce knowledge that educates citizens to allow them to develop values and promote sustainable practices in their daily lives. Furthermore, efforts in the field of education may assist learners to actively take decisions or pursue choices that integrate sustainable development into everyday practice (Valencia 2018). Over the years, the efforts to promote education for sustainable development at higher education institutions have yielded many positive results. One of them is that many organizations have been encouraged to introduce sustainability into learning practices. This is seen across multiple disciplines, and not only among those focusing on the environment or climate matters (Valencia 2018).

A further, key area where the implementation of sustainability is important, is research. Indeed, the amount of research on, about, and for sustainable development

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W. Leal Filho (✉)

Research and Transfer Centre, Sustainable Development and Climate Change Management,  
Hamburg University of Applied Sciences, Ulmenliet 20, 21033 Hamburg, Germany  
e-mail: [walter.leal2@haw-hamburg.de](mailto:walter.leal2@haw-hamburg.de)

has grown significantly over recent years, encouraging various other sectors to adopt sustainable practices (Wichaisri and Sopadang 2018). This is specifically helpful, as research can bring together many disciplines and ensure the co-production of knowledge. The trans-disciplinary action catalyzed by research enables researchers and students to develop practices that cater to the needs of multiple individuals and scenarios. Furthermore, research for sustainability has promoted innovation in many ways (Norström et al. 2020).

Campus operations are also a promising area, where many activities have been successfully undertaken (Leal Filho et al. 2015, 2018). The same applies to community engagement, where much higher education institutions are known to be active (Too and Bajracharya 2015).

In all cases, the knowledge co-production is based on four main principles: context-based, pluralistic, goal orientated, and interactive. These principles ensure that knowledge produced across all areas of action may reach a wide array of individuals while achieving specific goals. Furthermore, they cater to active practice rather than passive behavior. The former is especially beneficial towards ensuring the achievement of the SDGs (Norström et al. 2020).

## 2 Sustainable Development Across Disciplines

For decades, interdisciplinary action has been advocated to ensure that sustainable development occurs in a manner that accounts for knowledge from different sectors and disciplines. This can be achieved by ensuring that staff from different faculties come together to develop solutions for complex world problems and in providing blended solutions to existing and future problems that may arise (Annan-Diab and Molinari 2017).

In many cases, innovation is being introduced and promoted to provide fresh ideas for the attainment of sustainability (Rasiah 2019), especially within and between disciplines. Different institutions and disciplines within them are undergoing two main types of innovative changes.

The first includes **structural innovation** that promotes governance and coordination of efforts at universities. This may take place, for instance by appointing a sustainability team to ensure that sustainable development is carried out correctly.

The second is about **operational innovation**, which is carried out in the framework of campus' activities on the one hand, and in the framework of teaching on the other, ensuring that specific disciplines are maximizing their potentials to communicate sustainability-related messages across their audiences. An example may be creating deploying energy-saving technologies that could aid campus efforts to reduce their carbon footprint, also tackling renewable issues in courses (Ávila et al. 2017). Indeed, the use of technology has allowed individuals and stakeholders to connect, coordinate and support innovative practices. There are thus good reasons for intensifying efforts in this field.

Innovation may also help to build networks that can promote, finance, and implement sustainable development initiatives. These enable inter-and trans-disciplinary activities and aids in introducing sustainable development to less knowledgeable groups (Rasiah 2019). Figure 1 presents an overview of some of the areas where sustainability is associated with. This is by no means comprehensive and serves the purpose to illustrates a number of thematic elements it is connected with.

An example of an area which is emerging, can be taken from **health sciences** disciplines, which have begun to introduce sustainable practices into their activities and learning processes. A key example is during the COVID-19 pandemic, where reusable masks were promoted instead of disposable masks, as a measure to reduce plastic waste and ocean pollution (Shruti et al. 2020). In other instances, knowledge from the health sector is actively involved in designing sustainable cities, to ensure that the health and well-being of residents are accounted for. More specifically, problems related to pollution are being considered more often, aiding efforts to ensure that citizens are safe. This aligns with the SDGs and helps to move toward a more sustainable future (Vardoulakis et al. 2020).

In a different sector, namely **agriculture**, sustainable development is also gaining popularity. Innovation in agro-practices, machinery, irrigation, and resource management has allowed for a greater presence of sustainable development thinking in agriculture. Furthermore, smart agriculture is being introduced in rural areas where

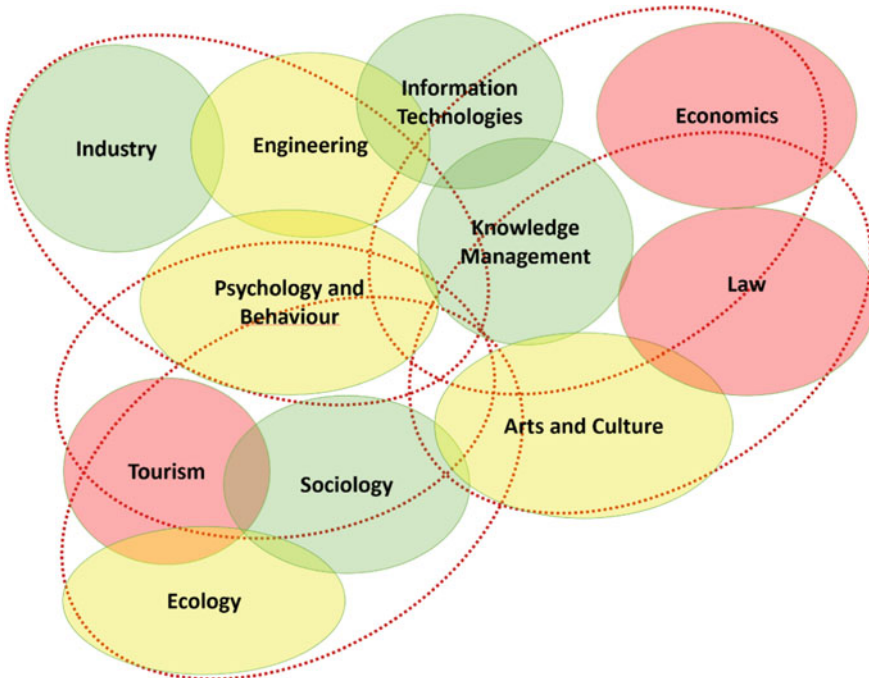


Fig. 1 Some of the areas sustainability is associated with

smallholder farmers can learn how to grow crops with reduced or minimal environmental impacts. This aids in rural development and further promotes the achievement of various SDGs (Molina-Maturano et al. 2020). Furthermore, the use of fertilizers is controlled to ensure that nitrogen flow into terrestrial and aquatic environments is monitored and optimized. This, in turn, may prevent processes such as eutrophication, that cause environmental imbalances (Ladha et al. 2020; Karcher et al. 2020).

In **architecture and construction**, two further key areas, sustainability is being incorporated into the design, providing a sound basis for further development. This assists in creating green buildings and *inter alia*, cities that are compatible with the sustainable development agenda. The goal is to create environmentally friendly cities and facilities while reducing economic and health impacts via smart design. Furthermore, life cycle assessments are being introduced and promoted more often, to ensure that the materials used in buildings meet the sustainability criteria at all levels of production and after-life (Abdelfattah, 2020).

In the discipline of **economics**, sustainability has been promoted extensively. Firstly, sustainability is actively being integrated into the curricula of economy-related courses at universities around the world. This prepares students to make knowledgeable decisions about what the economic implications of what is produced and consumed in society. Technology alone cannot achieve sustainable development. Therefore, economics assist in the understanding of the flow of resources, and how these may act as drivers of global environmental problems and pressures (Bradley 2019).

Secondly, the development of circular economies is being pursued in many countries. This has positive effects on sustainable development (Berg et al. 2018; Ogunmakinde 2019). Due to its importance, this issue is discussed at a greater level of detail in the next section.

**Tourism** is also a sector that is currently gaining momentum within sustainable development. Increasing numbers of tourism-related courses are being developed to consider sustainability issues. This allows for job creation, income generation, and the economic growth of the concerned regions within a country. Furthermore, sustainability thinking in tourism means that tourist areas are closely monitored and that environmental conservation is promoted, which allows for the preservation of natural resources (Tien et al. 2019).

In **engineering** faculties, the concept of environmental engineering has found its way among students. However, research has indicated that not enough is being done to fully integrate sustainability into the engineering sector. More efforts need to be made to promote sustainable behavior and activity considering the potential impacts of the engineering sector on the environment (Thürer et al. 2018).

### 3 Future Trends in Sustainability

As the previous section has shown, much has been achieved to date to promote sustainability across disciplines. But, to achieve the United Nations Sustainability

Goals by 2030, new methods and additional ideas need to be developed. This involves fostering innovation that will ensure that sustainable development is implemented at different levels and across sectors.

As earlier stated, the concept of circular economies has gained popularity over recent years. Circular economies are mostly seen within the European Union. Considering the usefulness of circular economies, the coming years are expected to see more countries adopting this approach. It aims to boost employment, ensure growth, reduce carbon emissions and manage/conserves resources, trends that positively impact sustainable development. Overall, it helps both the environment and the economy, which is beneficial for all nations (Sánchez-Ortiz et al. 2020). Furthermore, business innovation models that promote or fit into the circular economies may be beneficial to both a given company and the region and country which hosts it. This promotes resource efficiency and sustained growth (Pieroni et al. 2019).

Similarly, increases in green and bio-economies are also expected in the future. Like circular economies, these models are used to achieve sustainability. Green economies acknowledge the importance and usefulness of natural/ecological processes while bio-economies are resource-centered (D'Amato et al. 2017).

In recent years the area of **sustainable fashion** has gained momentum, considering the significant contribution of the fashion industry to resource consumption and waste. Many clothing brands are incorporating sustainability into their design, to ensure that resource depletion is prevented, and biodegradable or recyclable materials are used. Such design significantly reduces the carbon footprint of the industry (Moorhouse 2020; Moorhouse and Moorhouse 2017).

However, sustainable fashion does not only involve suppliers but rather incorporates consumer action. Consumers are being more aware of the consequences of their actions, and their consumption patterns. Furthermore, they are becoming more knowledgeable about manufacturing processes which allow for socially responsible decisions to support sustainable brands (Khandual and Pradhan 2019). Recent statistics indicate that sustainable fashion or searches for related brands rose by 66% in 2019. This was compounded by searches for ethical brands and organic materials. Popular items such as denim saw a 187% rise in searches for sustainable denim (Lyst 2019; Mohr et al. 2021). This is expected to rise, as consumer awareness and knowledge increase (Mohr et al. 2021).

In other instances, **electric cars** are being commonly used as a sustainable model of transportation (Jenn 2020). This is especially so in more developed countries. Electric vehicles are a method used to make private transportation cleaner and energy-efficient. Furthermore, the use of electric vehicles in lift services such as Uber has shown a carbon emission reduction of three times more than the one by normal motor vehicles. This is significant and promotes the usage of electric vehicles as part of sustainability efforts (Jenn 2020; Wu and Zhang 2017).

**Climate change** is one of the biggest hindrances to sustainable development. Whereas climate change undermines the achievement of the SDGs, climate action reinforces all SDGs. Therefore, more needs to be done to address the roots of climate change, and its effects. Efforts in this area are expected to increase significantly in the future years (Nerini et al. 2019). Areas that are of priority are:

- (a) reducing carbon emissions and
- (b) pursuing innovative adaptation methods.

An example of a method that is becoming popular, is innovative agriculture. This includes inducing epigenetic changes in the plants that target specific traits, which in turn, helps to build resilience to extreme weather events. Currently, various studies are being carried out to produce drought-resistant crops. However, more efforts are needed to sustain future adaptation methods (Martinelli et al. 2020). Similar innovation is expected to increase significantly in various other fields.

Although already practiced in many regions, **renewable energy** is one of the biggest moves toward sustainable development. This is expected to increase considerably in the future as a method to reduce greenhouse gas emissions and achieve carbon-neutral cities. Renewable energy technology such as wind power, geothermal energy, and solar heating are methods that help reduce carbon dioxide concentrations and fossil fuel usage (Østergaard et al. 2020). Therefore, their use promotes resources conservation and aid in pursuing sustainability. However, the costs of renewable energy often act as a barrier to sustainability. Therefore, more policies and finance need to be allocated to this area in the future (Gyamfi et al. 2018).

In the future, **transparency** will play a major role in achieving the SDGs. This is seen in the form of sustainability audits that will prompt public and private organizations to report on their actions. Such behavior will lead to environmentally and sustainably conscious businesses and promote the sustainability agenda (Montero and Le Blanc 2019). Furthermore, more policies will be created, in the context of which transparency may be accounted for, tackling various problems (Pahle et al. 2021).

Furthermore, **education** has been highlighted as a key for the achievement of sustainable development. The fact that higher education institutions are engaged in implementing the SDGs on their campus and within their communities, may maximize their ability to promote education for sustainable development and implement sustainable development programs (Zhou et al. 2020). Furthermore, lifelong learning is vital in spreading sustainability knowledge in informal settings that can contribute greatly to the accomplishment of the SDGs. This is also likely to be increased in the future (Karani and Preece 2020).

**Digitalization** is described as a transformative tool that can change the way we live and work. The recent advancements in technology give digitalization the power to potentially improve living conditions and contribute to sustainable development (Van der Velden 2018). Digitalization can also be used to reduce carbon emissions by optimizing production processes, allowing for decreased energy consumption. Such reduction decreases fossil fuel usage and -in turn- CO<sub>2</sub> emissions (Fritzsche et al. 2018; Renn et al. 2021). Furthermore, to decrease resource usage, digitalization can be used to promote additive manufacturing that creates lighter products and thus decreases resource depletion (Rinaldi et al. 2021).

## 4 Conclusions

This final chapter has shown the potentials of sustainability, and the various areas where it can be deployed, both within and outside the higher education sector.

It has also illustrated the fact that the field of sustainable development is a highly dynamic one, where changes and new trends continuously take place. This demands a great capacity from both institutions and educators, to adjust themselves to these changing conditions. Also, the global attention to sustainability is being challenged by many developments, such as the current COVID-19 pandemic, as well as the increasing pressure from problems related to security (especially conflicts) and other globalization issues. Therefore, to move forward, future efforts to further pursue sustainable development should pay attention to some key issues, such as:

1. the need for structural changes to make sure sustainability has a place in the curriculum and operations of institutions;
2. the change in forms of work, which has been accelerated by the COVID-19 pandemic;
3. the influences of globalization and mega-themes such as climate change, which are known to have an impact on the prospects to pursue sustainable development;
4. the need to adjust and take advantage of digitalization, as a tool to promote and foster a greater awareness of sustainability;
5. the need to better link sustainability with society;
6. the connections between isolated sustainability efforts and the implementation of the UN SDGs.

Finally, a greater emphasis should be given to the inter-and transdisciplinary nature of sustainable development across disciplines, bearing in mind it permeates all fields of science, from natural science and engineering to social sciences, especially economics. Finally, more concrete links with the problems and challenges society faces are also needed, to allow a better understanding of the role played by sustainability, as a tool to improve quality of life.

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