



# Sustainability Science for the Future

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## Abstract

This final chapter describes the advantages of pursuing sustainable development, the challenges associated with it, and presents an overview of future trends.

## 1 Introduction: Advantages to Pursue Sustainable Development at Institutions

Since the creation of the sustainable development goals, higher education institutions have made a concerted effort to incorporate sustainability into their practices. This was carried out through the development of declarations, design of new curriculum, sustainable campus practices, and formation of partnerships at a regional and global levels (Lozano et al. 2015; Findler et al. 2019).

Education for sustainable development is a powerful tool to promote sustainability amongst people and condition their mindsets towards sustainable living (Kopnina 2020). More specifically, it involves equipping people with the necessary skills,

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knowledge and attitudes that will aid in creating a sustainable future (Blessinger et al. 2018). Higher education institutions have the ability to implement modules, curricula, tasks and learning that promote sustainable development (Annan-Diab and Molinari 2017). This allows for a targeted approach to sustainability with the advantage that higher education institutions are able to reach more individuals. Furthermore, institutions have the research and expertise that can be used to effectively promote sustainability which may be lacking in community-based engagement (Ferrer-Estévez and Chalmeta 2021).

Furthermore, universities can build their own agendas that incorporate sustainability. This involves redefining academic principles, engaging in sustainability research and more importantly carrying out green campus operations (Wu and Shen 2016; Owens 2017). The latter involves identifying activities on campus that negatively affect the environment and finding more sustainable alternatives. This is particularly advantageous as campuses often function as independent communities in terms of regulatory processes, energy usage, transportation and waste removal amongst others. By optimising these processes, a huge contribution to sustainable development is made (Owens 2017).

In terms of research, universities are able to acquire public and private funding which helps with carrying out in-depth research that contributes positively to ensuring people understand what is needed for the SDGs to be achieved as well as finding simple optimised solutions to problems (Saeed 2019). More specifically, institutions are able to bridge the gap between what is taught and what needs to be learned through research while taking advantage of technology, educational resources and distance learning which enables a wider population of people to be targeted (UNESCO 2021). Additionally, universities are able to form partnerships with other institutions to educate the general public in terms of lifelong learning which aids in the progression of sustainability (Saeed 2019).

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## 2 Challenges to Pursue Sustainable Development

Despite the fact that the United Nations General Assembly agreed with the Sustainable Development Goals (SDGs) there are many challenges and barriers which are hindering progress in achieving sustainability (Ávila et al. 2019).

To achieve sustainable development, global action is essential, and financial constraints need to be accounted for and overcome. Aside from this it has been observed that the achievement of certain SDGs comes at the expense of other SDGs. More specifically, this has been described as trade-offs and acts as a limitation/challenge to goal achievement (Cernev and Fenner 2020). There are some key barriers to be met to achieve sustainability, as seen in Table 1.

In other instances, proper governance has been highlighted as a key for achieving sustainable development (Biermann et al. 2017). Countries of different economic statuses have different governing systems in place for the achievement of sustainable development. However, certain countries lack proper governance that focusses on sustainability. Furthermore, it has been noted that certain systems account for

**Table 1** Some key barriers to sustainable development

| Barrier to sustainable development   | References  |
|--|---|
| Lack of political will<br>Diverging political priorities   | Adetunji et al. 2005, p. 620<br>Stewart et al. 2016, p. 24          |
| Lack of clarity & contradictions of the concept<br>Heterogeneity of attitudes towards sustainability                                       | Adetunji et al. 2005, p. 616<br>Costache et al. 2021, p.5           |
| Institutional barriers (e.g. lack of specific regulations)<br>Legislative and institutional difficulties                                   | Browdy and Hargreaves 2009, p. 27<br>Costache et al. 2021, p.13     |
| Differing views and conflicts of interest among major players<br>Heterogeneity of attitudes towards sustainability                         | Adetunji et al. 2005, p. 617<br>Costache et al. 2021, p. 5          |
| Technical and technological barriers to innovation   | Browdy and Hargreaves 2009, p. 65<br>Zelenika and Pearce 2011, p.16 |
| Poor monitoring and evaluation systems   | Morales Pedraza (2014).<br>von Raggamby and Rubik 2012, p.4         |
| Limitations in (or lack of) financial resources  | Costache et al. 2021, p.13<br>Stewart et al. 2016, p.24             |
| Limitations in human resources   | Costache et al. 2021, p. 13<br>Stewart et al. 2016, p.24            |
| Deficits in research and thematic gaps   | Morales Pedraza 2014<br>Costache et al. 2021, p.17                  |
| Difficulties related to customers (preference for unsustainable and cheap products)<br>Lack of understanding and knowledge among consumers | Costache et al. 2021, p.13<br>Stewart et al. 2016, p. 25            |

sustainability but lack essential components that make the sustainability transition easier. These can include lack of implementation, vision, objectives or monitoring and evaluation. This leads to different countries being at different levels of sustainable development posing a challenge to global sustainability initiatives. Countries need collaborative action to fill in the gaps that reside in different nations with regards to sustainability (Morita et al. 2020).

Aside from this, corruption within the governing systems of countries may lead to a misuse of funds targeted to sustainable development initiatives. Recovering these funds is not always possible, often worsening situations (Frolova et al. 2019).

Additionally, in certain countries it is observed that a little emphasis is placed on a systematic pursuit of sustainable development. Often, many initiatives are short-term and undertaken on an ad hoc basis. Furthermore, it is often ignored that sustainability goals cannot be achieved single-handedly but requires the formation of collaborations between organisations, including businesses and other social actors. More specifically, these partnerships need to identify and form synergies to achieve common goals. Without partnerships, it becomes difficult to progress towards sustainability as a whole, and to effectively implements the SDGs in particular (Ali et al. 2018).

One of the biggest challenges in achieving sustainable development is downplaying the role of education in sustainability. Higher education institutions are a

powerful tool for spreading awareness about the issue and allowing for collective action. However, many countries do not fully utilise the power of education to achieve sustainability. This slows the progress of sustainable development in the area (Zhou et al. 2020).

Furthermore, capacity building is required for sustainable development. Many nations have citizens that lack the skills and tools to carry out sustainable initiatives. This is attributed to lack of finances or resources and thus inhibits the progress of sustainable development in the country (Jaiyesimi 2016). Additionally, some cultures prevent groups of people from being open to new ideas, development, and changes. This seen significantly with indigenous groups which hampers the implementation of strategies (Ashencaen Crabtree et al. 2019).

One of the most recent challenges to sustainability is the COVID-19 pandemic. This has led to already existing barriers being placed under stress due to the pandemic. The pandemic has led to a diversion of resources whilst worsening unemployment and poverty in many countries which is not in line with SDGs. The focus has been shifted from sustainability to the pandemic (Barbier and Burgess 2020; Jones and Comfort 2020).

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### **3 Some Future Trends on Sustainable Development**

Some recent papers have identified the impacts of the COVID-19 pandemic on sustainability research (Leal Filho et al. 2021a) and teaching (Leal Filho et al. 2021b). There are also some trends related to sustainable development, which are expected in the future. They are a mixture of recent developments such as the COVID-19 pandemic, the evolution of technology, and some societal changes. Due their relevance, they these trends may be clustered into 3 main categories.

#### **3.1 Category 1 Trends Associated with the COVID-19 Pandemic**

- (i) greater reliance on distance education and on-line teaching, as a means to cope with the restrictions in contacts triggered by the pandemic,
- (ii) a reduction, at least temporarily, in the number of physical meetings (e.g. seminars, conferences),
- (iii) more intensive on-line interactions between research teams, to balance the lack of physical contacts,
- (iv) increases in the number of research projects which take the implications of the pandemic to teaching and research on sustainable development into account,
- (v) reduced funding for sustainability research projects, due to competing funding priorities triggered by the pandemic, which.

### 3.2 Category 2 Technological Trends

- (i) wider use of on-line communication programmes such as Zoom, Microsoft Teams, WebEx and many others, whose availability has greatly increased during the COVID-19 pandemic,
- (ii) further development of on-line formats for evaluation of students' performance,
- (iii) more peer-reviewed journals which use open access formats, which may increase access and market penetration,
- (iv) greater use of on-line tools to evaluate sustainability projects,
- (v) increased use of IT-based tools for bibliometric analysis, surveys, enquires and other forms of data collection.

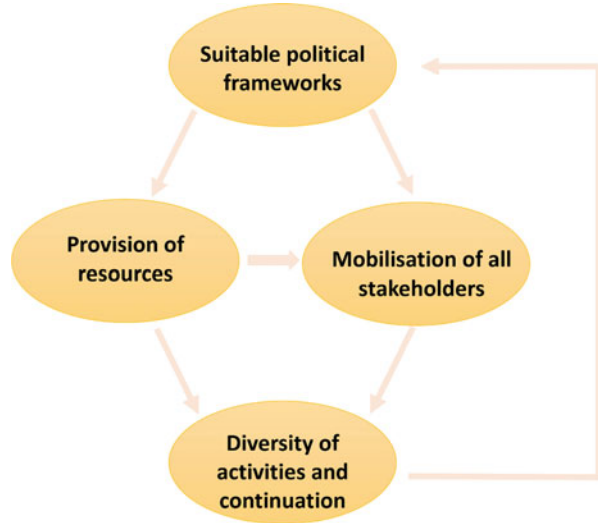
### 3.3 Category 3 Societal Changes and New Behaviours

- (i) increased presence of researchers from developing countries in mainstream sustainability research, since the communication divide has been partly addressed and they are becoming more present in the international literature,
- (ii) a greater engagement of the general public on sustainability affairs, driven by an increased awareness of how individuals can contribute to areas such as sustainable consumption and the impacts of their behaviour,
- (iii) an increased in the political emphasis to sustainability, as it is more widely taken into account in the political discourse and is increasingly being taken into account in legislation,
- (iv) the wider use of sustainability as a criterium for public and private-funded projects, often followed by measures to assess progress and measure results,
- (v) an increased awareness of the fact that true sustainability cannot be regarded as a question of compromising environmental protection with economic development, but that it needs to be perceived as a framework where decisions should be ecologically sound, economically viable, socially just and ethically acceptable.

Finally, it is expected that trends associated with climate change, energy generation and use, the emerging of diseases, mobility, circular economy and other areas, will also significantly influence the future of sustainable development. Figure 1 summarises some of these developments.

It needs to be acknowledged that, in order to yield the expected benefits, it is important that works are performed in a continuous way. Potential conflicts also need to be addressed in an objective manners, so as to allow things to move forward in a constructive way.

**Fig. 1** Some elements which influence the future of sustainable development



## 4 Conclusions

This final paper has illustrated some future trends as they apply for the evolution of sustainable development, which- due to their scope- also have implications to teaching and research on sustainable development.

As the field of sustainability moves forward, and as we progress towards the implementation of the UN Agenda 2030 -and especially the UN Sustainable Development Goals-, there are many opportunities for innovation. Indeed, innovative approaches are needed to address current problems, since many of the solutions deployed in the past, have had a limited degree of success.

As we strive towards future progress, we need new ideas, the design and use of new technologies, and the adoption of new insights, to as to search, test and implement sustainable solutions to the many environmental and societal problems we experience today, paving the way for a more sustainable living and, inter alia, a more sustainable future.

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