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## Participation and Sustainable Development

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### Introduction

The concept of citizen participation is unquestionably linked to the concept of sustainable development. Promoting equitable, inclusive, and fair societies involves generating processes for citizen participation that imply shared decision-making and an assumption of responsibilities in favor of global sustainability (Agenda, 2030; Heras 2006).

All those environmental issues that, whether directly or indirectly, affect the lives of citizens, the environmental conditions that surround the places where these citizens live, work, or visit, and the products that they usually use or consume, are an incomparable scenario for the exercise of citizen participation and the development of democracy in its many facets and are also an inexhaustible source

of socio-environmental situations-problems for the testing of new forms of democracy and citizen participation (Poza-Vilches 2008).

Levels measuring citizen participation is an indicator of the type and quality of democracy. Developing participatory democratic processes includes ways of operating and citizen decision-making models that go beyond the electoral processes, shaping a democratic system designed by, and for, citizens (Poza-Vilches 2008, Aguilar et al. 1999).

From this perspective, the concept of participation, and its importance, has undergone continuous modifications that correspond to a given country's different historical stages, going from centralist models, based on the exclusive participation of governments, to much more open and flexible models where citizen participation makes full sense, with representative democracy models being questioned and a more participative model being sought. In the latter, social movements take on their true meaning by decentralizing decision-making in municipal governance and by supporting models that look for solutions from the community and citizen commitment (Poza-Vilches 2008; Heras 2006; Alberich 2004).

On the other hand, the comprehensive approach that comes out of the concept of sustainability highlights the very importance of the participatory process as a strategy to achieve the Sustainable Development Goals (SDGs) set out in the roadmap of the 2030 Agenda.

From this assumption, we propose the following definition that aims to clarify the suitability

and opportunity of linking both concepts by supporting a comprehensive definition that will help to incorporate sustainability as a transversal subject in the curriculum of higher education.

## Participation

Defining what constitutes participation is complex, given the amalgam of concepts and processes it involves. Hart (1993, p. 5; 2008) defines the term as “the capacity of the individual to express decisions that are recognized by the social environment and that affect the life of the community in which one lives,” and extends the term to all sectors of the population, including children and their ability to participate in different areas (Hart 2008, p. 20): “It is important to begin by noting that the ladder of participation addresses only a rather narrow range of ways that most children in the world participate in their communities. It focuses on programmes or projects rather than on children’s everyday informal participation in their communities and it is largely limited to describing the varying roles adults play in relation to children’s participation... We should therefore be equally concerned with how adults differently ‘set the stage’ for children to self-organize... We would do well to try to integrate our thinking on children’s formal participation and culture-building.” Gayford (2003, p. 129) adds the nuance of inclusion to the term and argued that “popular participation can be understood as a way of satisfying essential human needs and it is also an important way of bringing about social inclusion.”

Heras (2006) recognizes that participation enables citizens to “take part” in solving problems from a creative stance using their own knowledge and resources, sharing responsibilities in decision-making as a natural way to rethink and reformulate the different collective options within the community framework. The principal means of participation in society have been social movements that allow popular participation in decision-making processes. This participation has shown itself to be more related to the capacity of people to demand the right to participate than the opening allowed by their governments (De Moraes et al. 2013; Solano et al. 2018).

Funtowicz and Ravetz (1993) extend participatory concept to the “postnormal science,” and Matso (2016, p. 475) talks about “participatory research” and its benefits and controversies: “Ethically, participatory research can be seen as being more equitable, especially in situations where the issues being researched involve real-world societal problems and questions of justice, such as in the areas of community development, health policy, and environmental conservation. When those who are affected by the research are involved as colleagues in the research, helping with research design and implementation, the results are likely to be more relevant and trusted... Participatory research remains fairly controversial and misunderstood, both by scientists and nonscientists, many of whom consider it ‘soft’ or less rigorous... participatory research efforts are often complicated and challenging to implement.”

Within the field of sustainability, participation is an increasingly valued concept, employed as a formula to build consensus and arrive at the best decisions in relation to the great environmental dilemmas that exist today. Therefore, this last nuance in reference to the term participation leads us to consider it as a strategy that involves a learning process in itself (Reid and Nikel 2008) and, as such, must be addressed and supported in higher education curriculum because “the participatory processes that involve the commitment and interaction of various social actors, with different knowledge and perceptions in relation to environmental problems, constitute an essential part of mutual learning” (Heras 2006, p. 234) the study, interpretation and knowledge of which is essential in the field of higher education.

But taking into account the empowerment and purpose that we have claimed participation has throughout the text, we ask ourselves: what forms, types, and levels should then be considered? Reid and Nikel (2008, p. 56) propose three levels of questions to analyze participation:

- Level 1. Practice level. Delineating the practicalities of engagement: Participation in what? How is participation happening already? How important is the participants’ participation within the complete process? What are the criteria for being a participant? How is the

process of decision-making organized? What is the participants' view on the role of their participation within the process of environment-related learning?

- Level 2. Theory Level. Delineating the participation by engaging in theoretical, epistemological, and ideological theories: What construction or understanding of democracy underlies the decision-making process? What is the basic structure of the conceptualization on the participation? How will/might participation happen? How is the participation justified, if at all? (criteria for legitimacy).
- Level 3. Meta-theoretical Level. Delineating the involvement, outcomes, and impacts: Who defines what we call participation? Who/what is implicated in participating? What is the degree of freedom the participant has to participate? Who is not participating and why not? How would you recognize a group of people participating here? Whose (rather than what) reality counts in the process of participation?

### Forms and Types of Participation

If we look at the forms in which the population can participate, there are two distinguishable types, individual participation and collective participation – both complementary and not mutually exclusive – which shape it as a strategy of action that is transversal to the person and to the context of reference.

Individual participation is regulated by the local organic regulations that refer to the rules that govern a State, such as laws or regulations. As Pindado (2000, p. 42) points out, there are various citizen rights for this type of participation:

1. Right to information: citizens must be informed of the local policy of their reference context.
2. Right to oral intervention in public sessions of government bodies: citizens can intervene in plenary sessions in order to have their opinions, suggestions, and proposals heard.
3. Right to a hearing procedure: the local government announces the initiatives that will be implemented and hears neighborhood proposals and in some cases, there is an express commitment to respond to these proposals.

4. Right of petition, proposal, and citizen initiative: citizens have the right to submit a request to any local management department.
5. Right to be consulted; referendum: bring decision-making closer to citizens through a public debate on the proposals and initiatives in question.

In regard to collective participation, citizens participate through movements and social organizations articulated and regulated by the rules of participation, which favor the relationship between the individual and local public authorities. In many cases, these forms of participation are used in those less complicated management formulas and where the responsibility is minimal. Ideally this process would be designed to foster these collective participatory structures for decision-making in local management at all levels, with an important commitment to action within the process.

On the other hand, we can differentiate different formulas as types of participation, according to their purpose and the degree of commitment and social involvement that is acquired by the person. Therefore, we can identify the following participation types:

- **Citizen participation:** From the social science sphere, participation is linked to the empowerment of the person in the decision-making processes within the social system to which he or she is attached; this is known as social or citizen participation. According to Alberich (2004, p. 24), citizen participation “is the set of activities, processes and techniques by which the population intervenes in public affairs that affect them.” The involvement of people revolves around the creation of new forms of relationships with the state in order to favor the social transformation of their environment (Poza-Vilches 2008).
- **Political participation:** This is the tool that citizens can use to get involved in State issues and be heard before the public authorities. As such, it therefore becomes an essential element of democratic systems since it is linked to the election of those who govern, as well as the decisions they make and can

influence and affect government management (Uriarte 2002).

- **Social participation:** Social process through which “groups, organizations, institutions or different sectors (all social actors including the community), intervene in the identification of health issues or other related problems and come together in a solid alliance to design, implement and evaluate the solutions” (Sanabria 2001, p. 90; Ortega and Brito 2016, p. 183). From this perspective, this type of participation refers to the coming together of people with a common purpose determined by their interests and motivations. It determines, therefore, forms of collective participation that strengthens the social organization of a context and facilitates the development of sustainable democratic structures (Divulgación Dinámica 2017).
- **Community participation:** This deals with how “the different classes, sectors or social groups that animate a society are related and articulate the institutional system” (Barrios 2001, p. 217). There is encouragement for the empowerment of the community as a collective to make their own decisions and work independently and autonomously to improve their quality of life (Angulo 2016). “Unlike the community development approach, -which fosters dependency and passivity-, community participation develops democratic decision-making, inspires pride and facilitates authentic participation in the development process” (White 2000, p. 110; Angulo, 2016, p. 51). Therefore, community issues are addressed through internal participation and from the potential that groups have in regard to promoting collective growth from a shared common interest.

### Levels of Participation

Alberich (2004, p. 63) identifies three clearly different levels of participation:

- Level 1. Information/Education: The information and education of any public action is essential for the participation of citizens in the decision-making required for this intervention.
- Level 2. Consultation and debate: Debate and dialogue processes in the search for consensus.

- Level 3. Participation in management, shared management: To carry out a process of full participation, co-management or even self-management is the most conducive systems to favor these processes through a shared and participatory work.

As Alberich (2004, p. 67) points out, “through adequate information-training, consultation and participation in management, the existence of real public control (social control) over the activities of the State and the Market is made possible.”

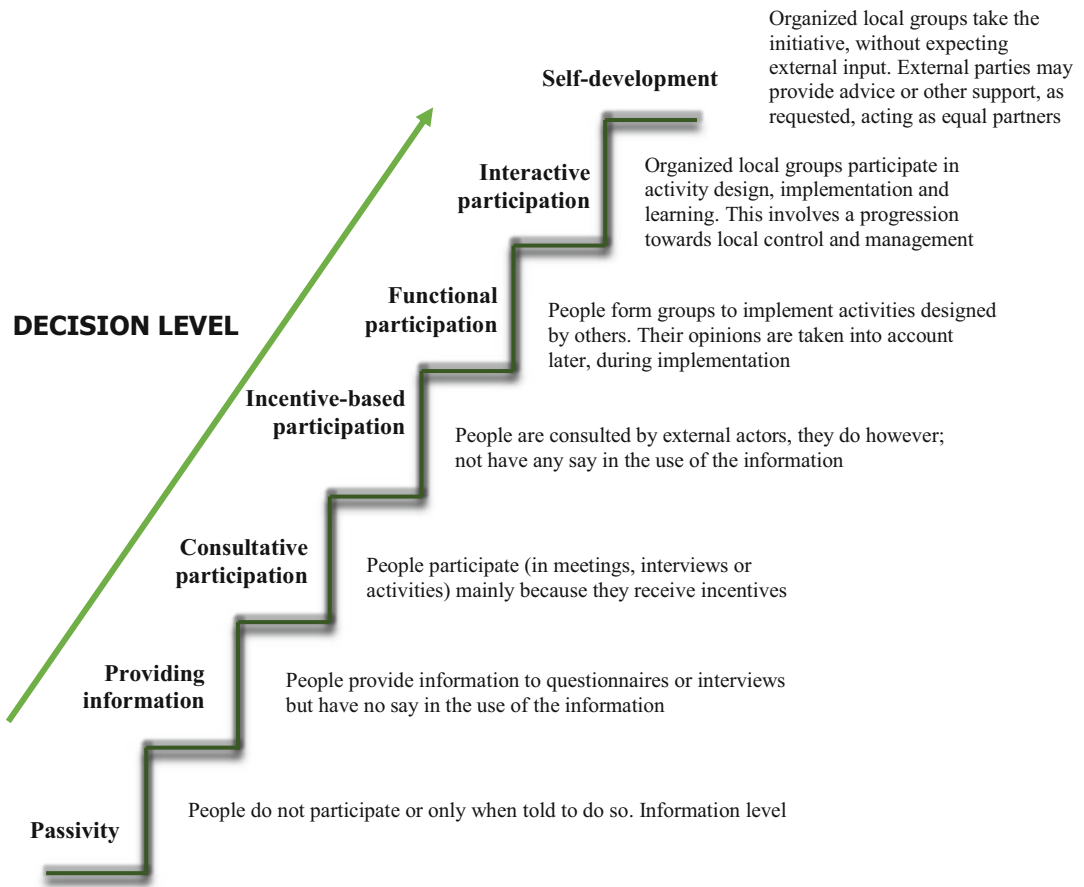
On the other hand, Geilfus (2009) defines these levels of participation as a ladder in which the individual gradually moves from an almost complete passivity, as a beneficiary of an action or service, to the control of their own process, becoming the protagonist of their development as indicated in Fig. 1.

The ladder visualizes participation as a process related to the degree of decision that one has in relation to decision making within a determined organizational structure. Actual participation begins when negotiation is possible between the various stakeholders, and the local community assumes part of the responsibility for decision-making (Bonie et al. 2017).

Undoubtedly, this social framework and empowerment does not make sense without positioning it within the political, social, and economic framework of reference in order to be able to, in this way, see the impact of our participation and social involvement in the framework context. But the task to define this concept requires speaking of social responsibility and commitment, of sustainable social action, of education for citizenship, and, therefore, of sustainable development and education for sustainability.

### Participation and Sustainable Development: Educating Environmental Citizens from a Multilevel Government Context

As way of reminder, we will outline what Sustainable Development is and the conceptualization from which we approach this analysis.



**Participation and Sustainable Development, Fig. 1** The participation ladder. (Adaptation of Geilfus 2009)

Sustainable Development is spoken of as “the development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (ONU, Brundtland Report, 1987). Over the last number of decades, the depth and effect of this concept has been such that it has become an international aspiration and a common goal globally. So far, it is the point of reference of all national, European, and international organizations in their work and in their daily activities of reminding and encouraging the idea that all citizens should adopt their shared responsibility to live their lives without endangering the opportunities of the generations to come. These organizations, at present, continue to propose new guidelines and approve new norms to achieve this objective (ONU 1992; ONU 2012 and Poza-Vilches 2008).

As Font and Subirats (2001, p. 10) points out, this report incorporates three fundamental premises:

- (a) It incorporates in its definition the concepts of development, social welfare, and quality of life.
- (b) Throughout the text, a demand for an equitable distribution of wealth in both present and future generations is highlighted.
- (c) It presupposes a rational use of resources as a way to ensure long-term habitability.

In short, the employment of these initial criteria means the intention for development to be equitable and long-lasting, so that it can promote well-being and an enduring and optimal quality of life in three fundamental areas: economic, environmental, and social.

In 2015, and after the end of the period of compliance with the Millennium Development Goals (MDGs), more than 180 of the UN's Member States designed a new action plan, the 2030 Agenda for Sustainable Development, resulting from an evaluation of these goals and the new global social, economic, and environmental challenges. This Agenda is, as of now, an updated practical guide for the States on the issues of sustainable development, an action plan with goals as universal as sustainable social and economic progress, energy prosperity that respects the environment, security, peace, and gender equality, without forgetting others that address freedom, the eradication of poverty in all its forms and dimensions, and a guarantee for the human rights of citizens; all of which are essential to achieve the aforementioned sustainable development (Fig. 2).

This concept of sustainable development, updated and defended by environmental policies, requires a transformation not only at a political level but also at an economic and social level, backing a participation model that promotes deliberation and citizen reflection in the search

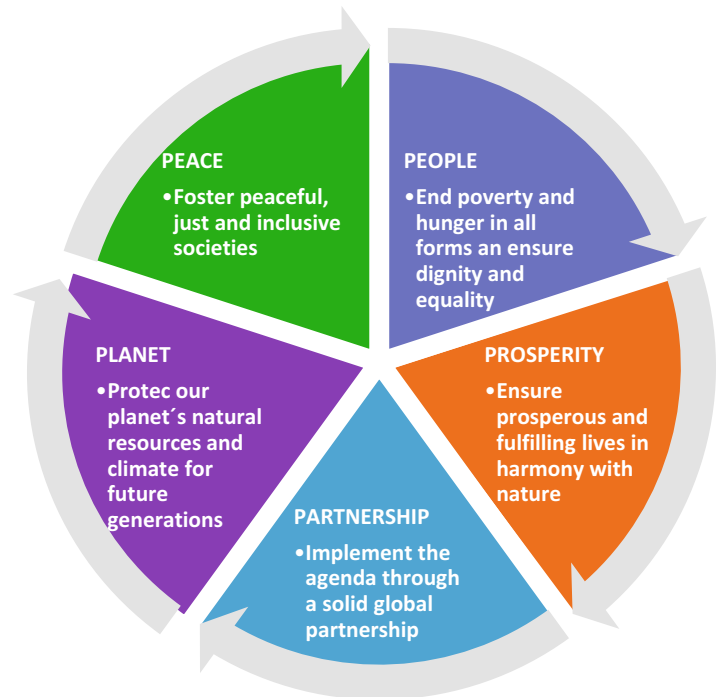
for consensus and the definition of the most appropriate action strategies to cover the needs of the context (Gutiérrez-Pérez and Poza-Vilches 2008, p. 55).

Governments play an essential role in this task. To make participation in the socio-environmental sphere effective, it is essential to accommodate the socio-political structures that articulate it. In this sense, it is time for governments to back new forms of management that make citizen decisions binding and requiring implementation. Democracy models more closely linked to participation in its full sense, rather than to representativeness through political groups, must be consolidated. A redemocratization process (Pastor 2012) is necessary where sustainable development, as a common universal goal, is the benchmark to advance processes of democracy and participation. It will be within this framework where the aspiration to develop more freedoms – the validation of individual and collective rights, achieving equity and social justice, social co-responsibility, peace, etc. – is fully realized.

This discourse is seen as a universal challenge, but at the same time, it highlights the variety of

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**Fig. 2** Sustainable Development Dimensions (extracted from 2030 Agenda for Development Sustainable)



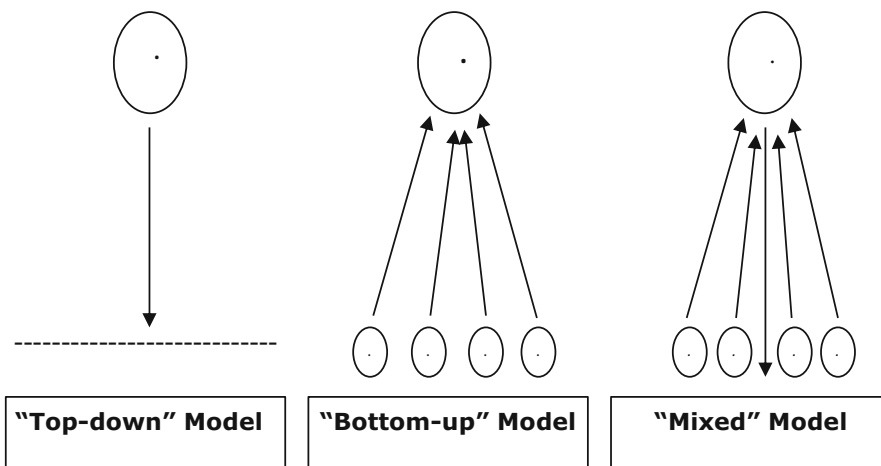
actors and institutions that come into play, with competencies at different levels and highlighting the complexity of environmental policies. Making decisions is evidenced as a process of the relocation of positions and stances to the end of achieving consensus. Therefore, to face this challenge, we must work on new forms of government that articulate and enable models of participatory environmental democracy, which can enable the emergence of spaces that expose and visualize demands, and that enable active action strategies in favor of sustainability in environmental policies. The development of “multilevel governments,” “network governments,” and “relational governments” (Blanco and Gomá 2002; Font and Subirats 2001; Dubois 2009) is conceived as a means to achieve this, where “political networks are more fluctuating and dynamic, and resources of all kinds are not only dispersed between a few actors only” (Aguilar et al. 1999, p. 273). Governance for sustainable development has become the ideal strategy for the development of participatory public management that also enables and guarantees socio-political interaction between governments, civil societies, and the market (Kooiman 2009; Ferrer et al. 2014). In this context, sustainable development emerges as an area to apply these new forms of governance (Farinós 2008; Ferrer et al. 2014) in favor of dialogue, collective reflection, and the search for consensus,

addressing socio-environmental problems at not only a level of compliance with individual expectations, but from a global position where the satisfaction of collective needs also prevails (Poza-Vilches 2008).

These sociopolitical approaches require setting and deciding the most opportune participation strategies that result in social, economic, and environmental citizen education processes in order to provide information on sustainable management models and act accordingly (Gutiérrez-Pérez and Poza-Vilches 2008).

So, from the approaches advocated here, new forms of government management based on a participatory philosophy, socio-environmental transformation, and network structure should be consolidated, where “all citizens have the disposition, motivation and place to participate in the decision-making processes, based on the principles of education, sustainability and equity” (Gutiérrez-Pérez y Poza-Vilches 2008, p. 61).

To build these networks, it is essential to create internal structures interrelated with external instruments that enable, stimulate, and dynamize the processes of network participation linked to governance and sustainability. Current literature differentiates three extreme modalities (Fig. 3) to categorize the types of participation processes of the networks linked to decision-making in sustainable management (Fraser et al. 2006, p. 114–127;



**Participation and Sustainable Development, Fig. 3** Approaches to decision-making and participation in networks. (Gutiérrez-Pérez and Poza-Vilches 2008, p. 62)



Gutiérrez-Pérez and Poza-Vilches 2008, p. 62): the “Top-down” approach, the ascendant approach (“Bottom-up”), and a third “Mixed” approach.

From the confrontation of these models, citizen participation claims their environmental rights from their governments, backing co-management and co-participation formulas that offer global visions of environmental issues and management models for shared decision-making (Maldonado-González and González-Gaudiano 2013). Participatory environmental democracy is regarded as necessary to “involve people and communities in local development and build the sustainable, inclusive and resilient cities of which global agendas speak” (Dávalos and Romo 2017, p. 129).

Resilience, understood as “the community capacity to face adversity, and come out the other side while maintaining its organizational stability, to develop the social capacity to learn from it and to manage changes to both risk and vulnerability conditions” (González and Maldonado 2017, p. 275), can help us to better understand the socio-environmental dimension and the human/environment analytical integration, which will favor the understanding of socio-environmental problems and, with it, the most appropriate design of related intervention strategies (Escalera and Ruiz 2011). These strategies can revolve around deliberation (opinion polls, juries or citizen councils, consensus conferences, and/or discussion circles) in which citizen opinion is investigated to detect problems and demands (first strategic level), or be a level of intervention and greater specialization with techniques that involve community involvement in local management through shared decision making and consensus (visualization of the future, deliberation on urban planning issues, local maps, or community forums) (Font 2000).

In short, these intervention strategies that involve activities of social participation in the models of political management in favor of sustainability are shown as a key resource for educating environmentally competent citizens, “citizens who are aware and informed of the environment as a whole, in its natural and modified aspect, with the capacity to assume the commitment to

participating in solving problems, making decisions and acting to ensure environmental quality” (Mrazek 1996, p. 20).

Educating for environmental citizenship involves fighting against a series of elements that exist in regard to the level at which we act as social subjects, which influences us on how to act in relation to the environment . . . education for environmental citizenship must be part of the process of education in values and for that reason, it is essential that it takes place not only in the school environment but in the different areas of our daily life and of the public sphere. (González-Gaudiano 2003, p. 5).

### **Cases Study. Examples of Good Practices Resulting from Citizen Participation Models to Foster Sustainable Development**

Following a review of international models, there are many examples of good practices that have generated processes of citizen participation linked to shared decision-making and that have placed value on sustainability and improvements to the quality of life. These experiences are exposed as practical references in the development of socio-environmental policies where citizen participation becomes meaningful and is considered a favorable resource for sustainable development in different contexts.

Good practice that combines participation and sustainable development is diverse and specialized, addressing those areas where it is possible to have an impact on sustainability. The following then is a list of a number of these experiences, serving as a reference of examples and practical cases for the academic and professional development of Higher Education students on topics of participation and sustainability:

- (a) **Local Agenda 21 processes**, approached from the development of participatory assessments: There are many countries and municipalities that have implemented strategic action plans linked to the design of Local Agenda 21 actions as a tool to incorporate sustainability in local governance from a participatory decision-making stance. In this sense, we



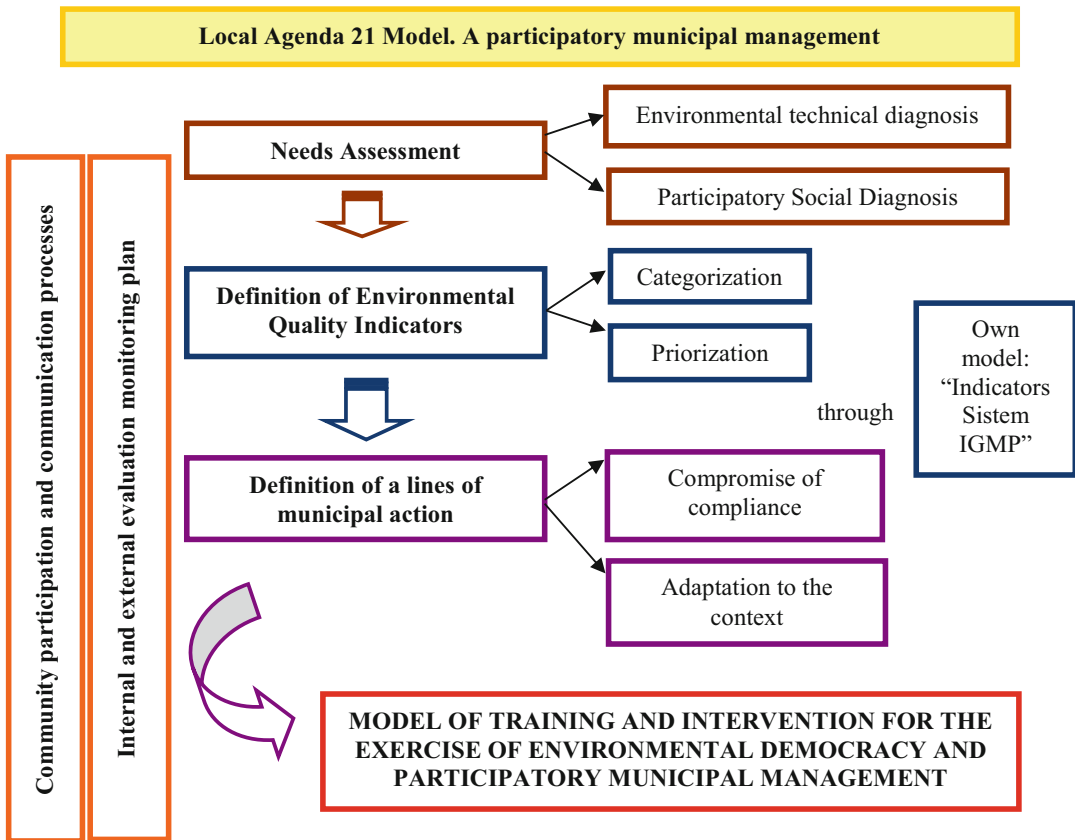
propose a practical case that uses the participatory diagnosis as the central axis in order to empower citizens in sustainable development processes on a local level. The Agenda 21 implementation model has been developed across several municipalities in the Autonomous Community of Andalusia (Spain) and aims to highlight the need to protocolize the process, using both physical-environmental and socio-environmental indicators and cross-sectional governance indicators (Gutiérrez-Pérez and Poza-Vilches 2008; Poza-Vilches 2008) that all favor citizen participation and education on socio-environmental issues.

- (b) **Sustainable city networks:** In several countries, cross-cutting activities for interchanges between cities are being looked at in order to create participation and networking platforms where knowledge, action, strategies, resources, etc., are shared and which serve to improve the quality of life of the citizens in terms of sustainability through shared work spaces: Spanish Network for Sustainable Development; Andalusia Network of Sustainable Cities (Spain); IDB's Sustainable Cities Network and the third Ibero-American Forum of Mayors; Colombia Sustainable Development Network, among others.
- (c) **National Strategies for Environmental Education:** In recent years, the design of strategic plans that aim to highlight the need to empower the populations of various socio-environmental sectors to favor sustainable development has become increasingly more proliferate across local governance models. To this end, we can point to Spain's Strategy with their White Paper on Environmental Education and its corresponding regional strategies in each region of the country, Ecuador's National Strategy of Environmental Education, Mexico's Environmental Education Strategy for Sustainability, and South Africa's National Framework for Sustainable Development.
- (d) **Smart Cities:** A smart city is a place where traditional networks and services are made more efficient with the use of digital and

telecommunication technologies for the benefit of its inhabitants and business. A smart city goes beyond the use of information and communication technologies (ICT) for better resource use and less emissions. It means smarter urban transport networks, upgraded water supply, and waste disposal facilities and more efficient ways to light and heat buildings. It also means a more interactive and responsive city administration, safer public spaces, and meeting the needs of an aging population ([https://ec.europa.eu/info/eu-regional-and-urban-development/topics/cities-and-urban-development/city-initiatives/smart-cities\\_en](https://ec.europa.eu/info/eu-regional-and-urban-development/topics/cities-and-urban-development/city-initiatives/smart-cities_en)): Smart City of Stockholm (Sweden), Smart City of Malaga (Spain), Smart City of Stuttgart (Germany).

- (e) **Participatory budgets in local governance:** This good practice is also a benchmark for citizen participation linked to sustainability. In this sense, there are many local governance institutions that have incorporated a participatory budget design that is endorsed by a consensus between the community and the government into their economic governance dynamics, including the participatory budgets of Porto Alegre (Brazil), Rosario (Argentina) the Basque Country (Spain), Bologna (Italy), north American cities including Ontario (Canada), Portland, Auburn and the State of Minnesota (USA), and in Asia, those from Yokohama (Japan) (Fig. 4).

These and other experiences highlight the importance of participatory processes in favor of sustainable governance models. On the other hand, working on the existing socio-environmental issues makes it possible to increase a citizen's motivation to participate in decision-making processes for these issues, since these are also key to their own well-being and quality of life. The participation-sustainability pairing results in development models for citizens who develop competent and sustainable competences through the process of formation and transformation, key, therefore, on a tertiary training level.



**Participation and Sustainable Development, Fig. 4** Local Agenda 21 Model. A participatory municipal management. (Poza-Vilches 2008)

**Conclusions**

Guaranteeing participation processes linked to sustainability means also to guarantee a process of personal and social learning from the enrichment of shared ideas for mutual learning and, therefore, for environmental learning (Heras 2006). This positioning of continuous training will enable us to make better decisions when facing environmental issues, and therefore, this issue has to be considered, in the university field, as a task of the first order to educate in favor of sustainability and to ensure participation processes are effective tools for social and environmental improvement.

Finally, from this clarification of concepts, we have tried to articulate how citizen participation is defined as an educational process, where environmental education at all levels (including Higher Education) is shown to favor a process of

transformation in relation to the individual and collective relationship with the environment that promotes the reconstruction of the network of relationships between society and the environment (Sauvé 2010). Participation is considered to be a tool for socialization and social empowerment to achieve the objectives and tasks of collective interest. On the one hand, sustainable development, undoubtedly, must be nurtured by these social leadership mechanisms in order to, on the one hand, promote accountability on the part of the management bodies in the development of more effective and sustainable policies and, on the other hand, promote citizen awareness through the assimilation of shared responsibilities and the development of pro-environmental attitudes that increase the quality of life globally – developing sustainable global policies and educating environmentally competent citizens.

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## Participative Teaching in Education for Sustainable Development (ESD)

► [Participative Teaching Methods for Sustainable Development](#)

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## Participative Teaching Methods for Sustainable Development

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### Synonyms

[Participative teaching in Education for Sustainable Development \(ESD\)](#); [Participatory Teaching Methods for Sustainable Development](#)

### Definition

Participative teaching methods are didactic methods, strategies and techniques that are focused on encouraging students to become actively involved in their learning process. They also aim to raise students' awareness and sense of responsibility about the organization, management and evaluation of their educational experience.

### Introduction

Participative teaching includes a set of didactic strategies and techniques that aim to promote a more active role of students in the learning process. This implies not only to engage students' interest in theoretical lessons, encouraging group discussions and critical reflections, but also to involve them in more practical activities, to connect academic achievement with real-life issues and to understand the impact of the individual actions on the community.

Since participative (also participatory) teaching methods recognize the importance to sustain the active engagement of students in their learning process, they can be defined in a learner-centered approach to teaching. Learner-centered teaching is mainly focused on the role of the students in the teaching-learning process, structuring the didactic activity on their needs, potentialities, personal and cultural characteristics, and individual learning objectives. In this approach, each student is encouraged to take the lead on his or her learning experience, in order to develop autonomy and responsibility (Weimer 2002).

In higher education, the theoretical framework for participative teaching and learning strategies can be identified in the transformative learning theory (Mezirow 1996, 2003; Taylor 2008), a new perspective, initially developed in adult education, which aims to support students in rebuilding their vision of the world. In the field of sustainable development, transformative education can be considered as the pedagogy for change (Sterling 2001, 2010–2011), where the learners can acquire all the abilities and knowledge for transforming himself or herself, the world outside,

and the future. Knowledge and competences are no longer viewed as “contents to be transmitted,” but they are considered the evolving products of knowledge creation, revision, and improvement. Participative methods in education include teaching strategies that can enhance these processes of change and awareness in students.

## **Participative Teaching Methods for Sustainable Development**

### **The Transformative Learning Theory in Education for Sustainable Development**

A main feature of current pedagogical approaches is the need to promote a lifelong learning perspective, which can engage the individual in formal and informal educational experiences for the whole life cycle. For this reason, new pedagogical issues have emerged, connected to the need to understand educational processes and their characteristics and define effective pedagogical experiences for adult people. In this perspective, the transformative learning theory has been developed (Mezirow 1996) for examining cognitive and communicative aspects of adult learning processes. This theory is based on a reconstructive perspective, and it focuses on specific cross-cultural features of the cognitive and communicative domains: in all the different cultures, adult learners develop specific cognitive structures, defined as “frames of reference,” which represent personal schemas for interacting in society and analyzing the events and objects of the real world. Frames of reference are related to personal values, cultural systems of beliefs, political orientations, interpretative mindsets, religious creeds, and psychological approaches to other people and to the reality. The transformative learning is not a method or a set of teaching strategies, but it can be considered a new perspective, which can help students to rebuild their vision of the world (Taylor 2008). It aims to support the achievement and development of the abilities necessary for reviewing frames of reference that people have passively received as static and unchanging and transform them into more reflective, personal, open, and flexible cognitive structures for

analyzing and understanding the surrounding reality (Mezirow 2003), respecting, at the same time, personal and cultural backgrounds of the learners. For these reasons, one of the main skills that should be empowered with a transformative pedagogical approach is critical thinking, enabling people to start reflecting and taking decisions autonomously (Taylor 2008).

In the approach of ESD, the paradigm of transformative learning has been considered crucial for achieving the learning outcomes related to sustainable development. More specifically, a transformative education for sustainable development seems to be the most effective paradigm for training resilient learners who can adapt to an evolving world and society, working, at the same time, for empowering more sustainable living contexts (Sterling 2010). This perspective considers learning as a process characterized by creativity, critical reflection, and participatory nature. Transformative education in sustainable development is focused on change, since it encourages changes in individual knowledge, values, attitudes, and behavior toward sustainability. At the same time, it promotes an attitude at acting “for change,” in order to co-participate in the creation of more sustainable future conditions for the human society and the environment (Sterling 2010–2011).

Teaching methodology for transformative learning is characterized by two main features (Sterling 2001): it is constructive, since it supports a perspective of learning as a construction of knowledge and meaning, and, at the same time, is participative, aiming to fostering a more active, reflective, and autonomous role of students, guided by the teacher as learning facilitator. The educational aim of transformative learning is settled at a very deep level, since it implies a paradigmatic change for students, impacting their epistemological dimension of learning (Blake et al. 2013); shifting to a new paradigm means also to restructure personal ways of thinking, reasoning, and interacting with the world. In addition, interpersonal relationships are crucial for implementing a transformative approach in education (Taylor 2007): the social exchange with other people represents the essential condition



for stimulating discussions, negotiation, ideas exchange, and potential revision of personal views. All these features can sustain the development of a new approach to the future and to sustainability issues.

Integrating transformative methodology in education requires a great effort from institutions, teachers, educators, and students (Sterling 2010), as it implies a deep break with the traditional educational approach. Originally developed and implemented in higher education, it may offer some important implications also for school education. Students acquire a relevant active role in transformative approach to the teaching-learning process: they become the real protagonists of their educational experience. This condition can be achieved only if a student-centered approach in teaching is adopted, where the learner is the focus of the didactic planning, designing, and implementing activity.

### **The Student-Centered Approach in Education for Sustainable Development**

In order to promote an effective condition of transformative learning, educational experiences should be structured and delivered within a student-centered pedagogical framework. Learner-centered (or student-centered) approach to education can be defined as a pedagogical approach in which teaching is structured on student's needs, personal characteristics, cultural background, potentialities, and learning objectives. More specifically, students are considered the active protagonists of their educational process (O'Neill and McMahon 2005), in a perspective that aims to help them in achieving self-regulated learning strategies and defining personal educational objectives.

The learner-centered (or student-centered) approach has been originally developed in the theoretical framework of socio-constructivism: its theoretical basis can be found in the works of some of the most influential authors in the field of social sciences in the twentieth century (Dewey 1916, 1938; Rogers 1962, 1969; Vygotskij 1978, for citing only some of them). In a general perspective, promoting the individual development and autonomy reflects Dewey's democratic ideal

of education (Dewey 1916). This concept states that educational institutions and educators should promote individual abilities in order to help students to adapt to evolving human communities and to reflect autonomously for establishing a more democratic society. This perspective implies also a change in the role of teachers, who, as theorized by Rogers (1962, 1969), should evolve in terms of "learning facilitator": educators should support students in the achievement of self-regulated strategies for becoming autonomous learners, respecting their individual features, needs, and potentialities. This educational aim can be achieved if each learner's characteristics and objectives are considered, respected, and enhanced in the definition and designing of the educational experiences (Dewey 1938) and if activities are planned for stimulating learning processes in the area defined by Vygotskij (1978) as zone of proximal development (ZOPED). The zone of proximal development is the developmental area included between the real level of development of an individual (that can be identified as the competences already achieved for solving a task autonomously) and the potential level of development (that can be reached if the person is helped and tutored by an expert, who, for young learners, can be a skilled peer or an adult; Vygotskij 1978). Respect for learners, attention to their already achieved and potential competences, sociocultural and educational background, needs, and difficulties are the main features of the learner-centered approach, which leads all the activities included in the teaching process, from the designing stage to the final assessment.

With reference to all the characteristics previously discussed, the learner-centered approach can be considered as an innovative and alternative approach to the traditional teacher-centered teaching. More specifically, while teacher-centered teaching is structured on a transmissive paradigm of education, student-centered approach represents the application of a transformative paradigm (Sterling 2001). The traditional teacher-centered approach to classroom activity is focused on the role of the teacher, and on his/her knowledge, which has to be transmitted rigidly to the students following top-down processes. On the contrary,



transformative learning can be enhanced if students are considered the starting point for defining and designing teaching activities: teaching is structured on bottom-up processes, which can consider different aspects connected to students, the local reality, and the cultural background of the community. This also implies to work for more inclusive classes, where the different needs of all the students are recognized and addressed, for fostering positive learning outcomes for all (UNESCO 2012), reducing the risk of marginalizing people from minorities. More attention is paid to the learning process, which can be considered systemic and oriented to co-creating meanings and understanding real issues (Burns 2015), instead of simply absorbing contents in a linear process. The educational approach can be defined participative, since it is based on a more active and autonomous role of students in the teaching-learning process (Tsien and Tsui 2007): they have the responsibility to lead and manage their learning activity, with the support of the teacher, who should sustain and empower students' autonomous decisions and actions in class. This can contribute to create the most effective conditions for Education for Sustainable Development, starting and enhancing changing process in learners' thinking, attitudes, and behavioral patterns.

For structuring a learner-centered approach in higher education, it is crucial to adopt and integrate in the educational activity teaching strategies that can enhance an active role of learners, encouraging critical reasoning and interpersonal exchange within the class. More specifically, according to Weimer (2002), there are five main dimensions that should be improved in teaching methodology in higher education for promoting a learner-centered educational approach:

1. *The distribution of power in classroom*, balancing the educational power owned by the teacher with the active learning power of the students
2. *The content proposed during lessons*, which should be selected in order to contribute to a co-construction of knowledge within the class
3. *The role of the teachers*, which should shift from an authoritative model of knowledge to

a facilitator of learning processes and promoter of students' self-regulated strategies

4. *The responsibility in learning*, which should be enhanced in students by teachers encouraging autonomy in learning
5. *Evaluation practices*, which should include a multidimensional perspective of assessment and consider also the role of students' self-assessment in supporting significative learning processes

All these topics can be considered the starting point for reforming teaching activity in a learner-centered framework: participative teaching strategies can meet the need to integrate a more student-focused perspective in higher education pedagogy.

### **Participative Teaching Strategies in Education for Sustainable Development**

Participative (or participatory) techniques are teaching strategies that aim to promote an active role of learners in class (Sterling 2001). In the perspective of ESD, they can be considered the most effective strategies for pursuing learning outcomes related to sustainability, since they encourage the use of critical thinking and help to link theory with practice promoting learning by doing (Kucharčíková and Tokarčíková 2016). In addition, proposing classroom activities that implies students' active participation can sustain the development of an intrinsic motivational pattern to a change paradigm within sustainable development framework (Romanova and Lyshenko 2012).

Participative teaching strategies aim to increase awareness, personal responsibility, critical thinking, and attitudes to sustainability between students. The great variety that characterize these strategies could be summarized according to their main feature: teaching strategies based on discussion (class discussions, small-group discussions, focus groups, debates, etc.); teaching strategies based on the use of creativity and divergent thinking (brainstorming, role-playing, simulations, etc.); teaching strategies based on the analysis of specific cases (case studies, issue-analysis techniques, solution to the

incident); strategies based on practical activity (workshops, project-based learning tasks); and strategies enhancing the educational dimension of play (gamification activities and simulations). This potential classification is synthesized in Table 1.

Participative teaching strategies offer the opportunity to negotiate the educational experience and co-construct knowledge and meanings within the class and with the support of the teacher as facilitator. Many of these strategies are based on discussion and reflective activities: discussion can be viewed as one of the main means for encouraging autonomous thinking and interpersonal exchange, promoting not only the achievement of disciplinary contents but also their transformation, in the constant reviewing of the disciplinary discourse (Ma 2008). Discussion

strategies include class discussions, small-group discussions, focus groups, and debates (Ukaga and Maser 2004; Biasutti et al. 2018). These activities offer the opportunity to develop communicative skills (UNESCO 2012), enhancing critical reflection and the development of personal ideas and perspectives about sustainable development issues. In higher education, they can include a less directive role of the teacher, favoring a more participative and interactive role of the students (UNESCO 2012). In addition, tasks based on discussion can be used as assessment tools, in order to evaluate students' contents achievement and skills development as a result of the involvement in academic course (Ukaga and Maser 2004). In general, discussion is a versatile activity, since it can be proposed to students for examining a specific topic, reflecting upon some main

**Participative Teaching Methods for Sustainable Development, Table 1** Synthesis of the most used participative teaching strategies in higher education

Main feature	Educational objectives for sustainable development	Examples of strategies
1. Strategies based on discussion (Ukaga and Maser 2004; Biasutti et al. 2018)	Enhancing social skills Promoting communicative skills Encouraging critical thinking Negotiating personal attitudes and perspectives	Class discussions Small-group discussions Focus groups Debates
2. Strategies based on creative and divergent thinking (Gourmelom et al. 2013; Buchs and Blanchard 2011)	Supporting awareness about sustainability issues Encouraging divergent thinking Fostering creativity Promoting interpersonal exchange within the class	Brainstorming Role-playing Creative drama
3. Strategies based on the analysis of specific cases (Perdan et al. 2000; Kucharčíková and Tokarčíková 2016)	Encouraging critical thinking Integrate interdisciplinary contents in a perspective of sustainable development Applying theoretical concepts to real-life situations	Case studies Issue analysis techniques "Solution to the problem" activities
4. Strategies based on practical activity (Lehmann et al. 2008; Eyler 2002)	Developing awareness of local issues connected with sustainable development Promoting responsible and active engagement in sustainability issues (with particular reference to local ones)	Workshops Project-based learning activities Service-learning activities
5. Strategies based on game (Dieleman and Huisling 2006; Pohl et al. 2009; Coffey 2014)	Promoting students' engagement through the ludic dimension of learning Enhancing social competences and team building Developing strategical skills	Gamification activities Simulations

disciplinary questions (Ma 2008), and planning innovative solution for real-life problems.

Participative strategies based on the use of creative thinking in ESD encourage the reflection about sustainable development issues, promoting the creation of innovative ideas and alternative solutions and exploring and adopting new perspectives. Activities like brainstorming (Ukaga and Maser 2004), role-playing (Gourmelom et al. 2013; Buchs and Blanchard 2011), and creative drama (Keleş 2015) are very useful for fostering the expression of different points of view, ideas, and concepts (Gourmelom et al. 2013). These strategies can precede a discussion or debate, where the previously emerged ideas can be further examined, developed, and improved. They can also be used in different stages of the teaching-learning process: while the brainstorming can be mainly considered as a “warming-up” activity (Ukaga and Maser 2004) for examining beliefs, concepts, and perspectives that students already possess on ESD and sustainability themes, role-playing and creative drama require the achievement of some basic contents about sustainable development (Gourmelom et al. 2013; Buchs and Blanchard 2011), and, for this reason, they can be proposed for integrating a lecture or presentation in order to promote a more significant and participative learning process. Moreover, strategies based on creative thinking have a positive impact also on interpersonal relationships within the class (Buchs and Blanchard 2011), supporting the interaction between students and the exchange of ideas in a very engaging climate (Kucharčíková and Tokarčíková 2016).

Strategies based on the analysis of a specific case aim to make students reflect upon a hypothetical situation representing a sustainability issue (at a local or a global level), asking them to reflect and discuss about it for identifying and defining sustainable solutions. Learning activities structured on a specific case, such as the case study (Perdan et al. 2000), the solution to the problem (Kucharčíková and Tokarčíková 2016), and the issue-analysis techniques (UNESCO 2012), require to examine a problematic situation, identifying the main causes, the

possible negative consequences at both brief and long term, and discuss innovative solutions which can assure a sustainable resolution of the problem. These teaching strategies allow to test critical thinking and metacognitive skills considering a real situation in a sustainable development framework (Kucharčíková and Tokarčíková 2016), putting into practice theoretical knowledge and competences developed during academic lessons. One of the main features of these activities is their interdisciplinary nature (UNESCO 2012), for which contents from different disciplines have to be considered and integrated in defining an exhaustive overview of the specific situation: this is relevant for promoting the achievement of a systemic and holistic perspective in ESD (Sterling 2001).

Practical activities are teaching strategies that link the theoretical contents of the traditional academic lecture with more real-life, participative learning experiences. Workshops are the most common in academic courses (Kucharčíková and Tokarčíková 2016), offering students the possibility to experiment practical applications of what they have learned during lessons. These strategies also include activities and tasks developed in two specific teaching methods, the first focused on project-based learning (Lehmann et al. 2008) and the second based on service learning (Eyler 2002). Activities based on project-based learning help students to enlarge their view as individual and professionals, encouraging them to analyze and design projects in their disciplinary field considering not only the possible technological and economic results but also their negative or positive impact for a sustainable future (Lehmann et al. 2008). Service learning has a relevant role in fostering the awareness of the impact that individual actions have on the life of the community (Eyler 2002). In service learning methodology, students are encouraged to integrate their learning processes in the life and needs of the local community (Fourie 2003), applying themselves in social services and starting a critical reflection upon the real issues that characterized the local context in which they live (Eyler 2002). It is not only a matter of finding solutions to real

problems and being engaged in social activities but also a process of responsibility taking, recognizing that each personal action may affect (negatively or positively) the life and development of the whole community.

Participative teaching strategies also include activities and techniques based on games. These take advantage of the ludic dimension of learning for enhancing achievement motivation and engagement in class activity. Gamification activities are particularly useful in each school grade, and they can also have educational benefits for higher education and adult education. Games and simulations offer the opportunity to be engaged in a “learning by doing” process, experiencing the impact of personal decisions and actions without the real hazard to incur in negative consequences (Dieleman and Huisling 2006). These activities also allow students to put into practice different strategies and to develop strategical pattern for acting in a sustainable development perspective (Pohl et al. 2009), reflecting upon the most effective ways to integrate sustainability in their future professional activity. Through gaming, people can face and understand multi-dimensional and complex situations in a social climate that enhance team building, cooperation, and sharing experiences (Coffey 2014).

### Final Remarks

The approach of Education for Sustainable Development is focused on training people to face complex, interrelated systems and conditions, in order to find new flexible solutions needed for building up a more sustainable future (Huckle 1996). The great variety of participative teaching strategies allows educators that work for ESD to design and implement teaching activities that can promote a contextualized and significant learning experience: this goal can be achieved considering, in a multi-dimensional perspective, local and global issues focused on sustainability (UNESCO 2006). To motivate students to be engaged in ESD, it can be useful to integrate different teaching methods to explore and understand different topics and acquire transferable skills: it is important not to casually mix up several different strategies but to design an ESD

curriculum where participative methods and techniques are integrated in order to foster the achievement of specific learning outcomes for sustainability (UNESCO 2012).

As previously discussed, reorienting curriculum for sustainable development is more than simply adding contents related to sustainability: it means also, and above all, to structuring the didactic plan on pedagogical approach based on a transformative paradigm of learning (Mezirow 1996; Taylor 2008). Including participative teaching strategies in academic lessons is a challenging task, since it is difficult both for teachers and students to adopt a new perspective in the teaching-learning process. Traditional lectures and assessment based on written and oral exams are easier to be managed, since they do not imply an active engagement from students but required simply a transmission and reproduction of disciplinary contents. Unfortunately, this condition does not fully promote the achievement of learning outcomes for sustainable development, which include also the promotion of students’ participation for critically examining, reviewing, and negotiating disciplinary topics in a sustainability framework (Sterling 2001). Another critical point is related to assessment, since traditional evaluating techniques (oral examinations or written tests) do not convey the complexity of learning processes and outcomes developed through participative teaching strategies. For this reason, it would be useful to start considering, in the learning activity, a social dimension: this means, evaluating the level and the quality of students’ participation in the educational activity and in the process of knowledge construction (Disterheft et al. 2015).

The complexity that characterized the ESD approach in higher education implies an effort from both the protagonists of the educational relationship, teachers and students, for effectively integrating participative teaching strategies for sustainable development in academic activity: more specifically students need to be introduced, made responsible for, and motivated to adopt new educational approaches based on sustainable development, actively negotiating meanings, objectives, tasks, and assessment for ESD with teachers (Biasutti et al. 2018).

## Cross-References

- ▶ [Critical Thinking Methods for Sustainable Development](#)
- ▶ [Learning Outcomes for Sustainable Development](#)

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## Participatory Teaching Methods for Sustainable Development

- ▶ [Participative Teaching Methods for Sustainable Development](#)

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## Pedagogic Tool

- ▶ [Storytelling for Sustainable Development](#)

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## Perceptions

- ▶ [Students' Perspectives on Sustainability](#)

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## Performing Arts

- ▶ [Arts-Based Approaches for Sustainability](#)

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## Personal Social Responsibility and Sustainable Development

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### Definition

Personal social responsibility is generally referred to individuals who have moral responsibility for

their moral actions and to behave as good members of society (Crane and Matten 2016; Gray et al. 2014).

### Introduction of Personal Social Responsibility

The notion of personal social responsibility has been widely discussed and has not provided the simple answer. In order to understand personal social responsibility, individuals try to understand what it is to be human beings and how individuals to behave as good members of society (Gray et al. 2014). There is the subtle and implicit relationship between morality and responsibility. Individuals are responsible for their moral actions, while individuals articulate their responsibilities for themselves.

In particular, morality tends to seek right and wrong solutions in the society and individuals will often rely on two main ethical positions: (1) ethical absolutism that is universally applicable moral principles and (2) ethical relativism that is moral principles in certain context (Crane and Matten 2016). Most conventional western ethical theories are likely to be absolute in nature that can apply universal rules and principles in any situation, while contemporary ethical theories offer a more relativistic position than conventional ones (Crane and Matten 2016). However, ethical pluralism appears to accept various moral foundations, so this provides a middle ground between absolutism and relativism, and this suggests a consensus on fundamental rules and principles in particular social context (Crane and Matten 2016).

Various ethical theories have been discussed in the extant literature; however, no single universal rule or ethical principle could apply in any situation. Ethical theories vary across country, religion, and social value. There are four main theoretical frameworks that have been widely used in Europe and North American in the literature. However, the principles of these ethical frameworks are often overlapped with some ethical theories in Asia.



### Major Normative and Contemporary Ethical Theories

These theoretical frameworks are mainly divided into two main categories: (1) consequentialist theories and (2) non-consequentialist theories (Chryssides and Kaler 2005). The moral decision of consequentialist theories is primarily based on the intended outcomes or the certain goals, while the moral decision of non-consequentialist is strongly based on the “main principles of a decision-maker’s motivation” and is linked to Judeo-Christian thinking (Crane and Matten 2016: 83; Table 1).

The two main consequentialist theories refer to egoism and utilitarianism that appear to address right and wrong based on different intended outcomes. Egoism tends to focus on the outcomes for the individual decision-maker, while utilitarianism tends to emphasize on the wider outcome of the public or society at large (Crane and Matten 2016). The main contributors of egoism are Plato (Greek philosophers), Adam Smith (the modern economist), and Milton Friedman (the Nobel Prize winner). Egoism states that an action is morally right if individual decision-makers freely choose either their (short-term) desires or their (long-term) interests in a given situation (Crane and Matten 2016: 84). The weakness of egoist ethics appears to be mechanism of the market in the society that there is no individual pursuit personal interest at the expense of other people (Crane and Matten 2016). However, this assumption does not seem

to happen in the reality. In relation to sustainability, for example, markets are working imperfectly so income inequality induces uneven wealth distribution of the world population and leads to high risk of social instability.

The contributors of utilitarianism are the British philosophers and economists, notably Jeremy Bentham and John Stuart Mill. This theory appears to focus on collective welfare rather than individual desires or self-interests. Utilitarianism suggests that an action is morally right if the result could benefit the greatest amount of good for the greatest amount of people (Crane and Matten 2016: 85). Humans could be seen as “hedonists” as utility is normally measured by pleasure and pain, whereas humans could also be regarded as “eudemonists” as utility is often measured by happiness and unhappiness (Crane and Matten 2016). Utilitarianism has been very influential in the field of economics that measures the utility of certain actions. This is often known as *cost-benefit analysis* that individuals determine the moral decision according to the highest aggregate utility (Crane and Matten 2016). The limitations of utilitarianism are subjectivity, quantification, and allocation of utility, and thus utilitarianism are subsequently refined to two categories: “act utilitarianism” examines to a single action and bases the moral judgment on the amount of pleasure and pain causes and “rule utilitarianism” examines at collective actions and asks whether the underlying principles of an action generate pleasure rather than pain for society in the long term (Crane and Matten 2016: 87).



**Personal Social Responsibility and Sustainable Development, Table 1** Major normative ethical theories

	Egoism	Utilitarianism	Ethics of duties	Rights and justice
Contributors	Adam smith Milton Friedman	Jeremy Bentham John Stuart mill	Immanuel Kant	John Locke John Rawls
Focus	Individual desires or interests	Collective welfare	Duties	Rights
Rules	Maximization of desires/self-interest	Act/rule utilitarianism	Categorical imperative	Respect for human beings
Concept of human beings	Humans are actors with limited knowledge and objectives	Humans are motivated by avoidance of pain and gain of pleasure (“hedonist”)	Human are rational moral actors	Humans are beings that are distinguished by dignity
Types	Consequentialist	Consequentialist	Non-consequentialist	Non-consequentialist

Source: Crane and Matten (2016: 83).

The two main non-consequentialist theories refer to ethics of duties and ethics of rights and justice. Ethics of duties is known as deontology that is the most influential theory that derives from the German philosopher Immanuel Kant. This theory appears to be abstract and deduced a priori moral rules that should be applied to all related ethical dilemmas (Crane and Matten 2016: 88). Kant (1785/1996) introduces the categorical imperative framework that includes three main principles: (1) consistency – individuals act only based on that maxim by which individuals will follow in all cases and it should become a universal law; (2) human dignity – humans respect others as rational actors so human dignity should not be ignored; and (3) universality – individuals' actions are based on the rules that give guidance to them. However, three main problems of using ethics of duties are difficult to access the outcomes, ignoring the complexity of the reality and optimistic view on rational decision-makers (Crane and Matten 2016).

Ethics of rights is often linked to John Locke, the British philosopher, who suggests that humans should be respected and protected by the state (Crane and Matten 2016). Locke perceived these rights as *rights to life, freedom, and property* and subsequently extended to rights to freedom of speech, consent, and privacy in the modern society (Crane and Matten 2016). Locke's ethics of rights somehow affect Rawls' (1971) *A Theory of Justice* that raises the main question, "Is there a way of organizing societal practices and institutions around principles of fairness and quality?" Beauchamp and Bowie (1997) state that theories of justice are normally seen fairness in two important ways: (i) procedural justice refers to fairness which is based on whether an individual are free to receive rewards for their efforts and (ii) distributive justice refers to fairness which is based on the positive or negative consequences are equally and fairly distributed. Rawls (1971, 1993) suggests two key criteria in order to achieve justice: (i) an individual has a right to equal basic liberties and (ii) economic and social inequalities are often addressed to the greatest benefit of the least advantaged and to all under conditions of fair quality of opportunity. In particular, ethics of

rights are typically related to economic activities and business decisions and how economic transactions are fairly distributed. However, the problems of distribution are not only limited to economic transactions, but also to a wider scope, such as community, public, and government (Crane and Matten 2016).

On the other hand, the extant literature has also discussed and examined four major contemporary ethical theories: virtue ethics, feminist ethics, discourse ethics, and postmodern ethics. Virtue ethics requires the development of virtuous character that enables individuals to make better decision rather than the simple application of general rules and principles (MacIntyre 1984). Virtues are personal qualities that possess moral virtues, a set of acquired traits of character, such as justice, courage, honesty, loyalty, modesty, temperance, and benevolence in order to become a good person (MacIntyre 1984). A virtue differs between different traditions of thought, but sometimes virtues are often overlapped with other traditions. Benevolence, justice, and courage in the European tradition are similar to "Jen," "Chih," and "Yi" of Chinese virtues in the Confucian tradition. These virtues are normally showed as a habitual pattern of individual behavior rather than a single ethical decision (Crane and Matten 2016).

Feminist ethics is one of the contemporary ethical theories. Feminist approaches are assumed that men and women have various ways to treat social life that leads to affect how they deal with ethical dilemmas (Gilligan 1982). The traditional ethical theory has been mostly established by male philosophers, notably Adam Smith, Jeremy Bentham, John Stuart Mill, Immanuel Kant, John Locke, and John Rawls (Crane and Matten 2016). The male approach is normally known as the "ethics of rights" as suggested by Maier (1997). By contrast, feminist ethics is called "ethics of care and relationship" that place a great emphasis on empathy, care for each other, avoidance of harm, and maintenance of harmonious and healthy relationships within a social web (Maier 1997; Rabouin 1997). Importantly, feminist ethics is placing emphasis on cooperation, comprise, and maintenance of relationship rather than gender approach (Crane and Matten 2016).

Discourse ethics intends to deal with daily ethical dilemmas by rational reflection on the real-life experience rather than individual belief systems (Crane and Matten 2016). Steinmann and Löhr (1994) argue that the aim of ethical issues should be ideally settled in a peaceful way and could be applied it on a daily basis. This ideal discourse has to meet certain philosophical criteria, for example, impartiality, non-persuasiveness, and noncoercion (Habermas 1983). Those people who are more influential and powerful in the situation should impose their values and views on others, and this would lead to the norms for tackling the ethical issues or problems (Crane and Matten 2016).

Postmodern ethics tends to question the relationship between rationality and morality of traditional ethical theories, thus postmodern scholars endeavour to adopt the positivist approach to find the scientific explanation of human, society, and nature (Crane and Matten 2016). This approach “locates morality beyond the sphere of rationality in an emotional ‘moral impulse’ towards others” (Crane and Matten 2016: 115). Thus, postmodern ethics highly encourage individuals to inquiry common practices, general rules, and usual operation, and individuals could listen and follow their personal emotions, feeling, or judgment what they personally think is right or wrong in certain ethical dilemmas. In other words, postmodern ethics tends not to adopt any rule or principle for any ethical dilemmas. Gustafson (2000: 21) suggests four main concerns on postmodern ethics: using holistic approach, showing real life examples rather than principles, and focusing on unique situation rather than generalization.

The above discussion provides a general overview of eight ethical theories in the modern society and offers different views on how an individuals make a moral decision when they face ethical conflicts and develop a sense of personal social responsibility. There is no single ethical theory that could be the true view of any ethical dilemma in the modern society (Crane and Matten 2016). These ethical theories could be regarded as “lens” or “prism” to help individuals to adopt a specific angle, such as egoism, utilitarianism, and justice, to express their views in a pluralist analysis (Crane and Matten

2016). Human beings make moral decisions based on their own rationality, emotion, social embeddedness, and past personal experience.

### **Linkage between Personal and Corporate Social Responsibility and Sustainability**

The previous section provides a brief discussion on various ethical theories; however, these ethical theories or values can be applied in the reality or even in the business context. This discussion is often associated with ethical leaders in organizations. Ethical leadership is normally described as the role of senior managers in shaping integrity and ethics within an organization and nurturing ethical and responsible behavior among employees (Crane and Matten 2016: 193).

The personal values of CEOs and senior managers can significantly influence how organizations operate in a responsible manner, for example, integrating sustainable development as a part of corporate DNA (Chin et al. 2013). A number of individual factors, such as age, gender, national and cultural characteristics, educational background, employment, psychological factors, personal values, integrity, and moral imagination, could possibly inform us about ethical decision-making of CEOs and senior managers (Crane and Matten 2016). Besides individual factors, situational factors should be considered on ethical decision-making. Situational factors are divided into two types: (1) issue-related factors and (2) context-related factors. Issue-related factors include moral framing and moral intensity suggested by Jones (1991) with six factors: magnitude of consequences, social consensus, probability of effect, temporal immediacy, proximity, and concentration of effect. Regarding contextual factors, business leaders play a crucial role to seriously affect such factors, such as rewards, authority, bureaucracy, work roles, organizational culture, and national context, when they face on ethical decision-making (Sims and Brinkmann 2002; Treviño and Nelson 2014).

There are two different modes of ethical leadership: ethical culture change and ethical cultural

learning. The role of leadership under the ethical culture change perspective is to articulate the personal values, beliefs, and standards so as to inspire organizations and motivate employees to follow the vision, while the role of leadership under the cultural learning approach appears to be employee empowerment so as to consolidate autonomy (Crane and Matten 2016). Therefore, employees are encouraged to have a critical thinking and are responsible to evaluate their own ethical decision (Rosenthal and Buchholz 2000). The employee empowerment is somehow in line with discourse ethics and postmodern ethics as discussed above (Crane and Matten 2016).

However, the above discussion is only limited to an individual level of moral or social responsibility. In modern business world, corporations are compelled the law. Arguably, corporations are typically viewed as a legally bounded “person” or an “artificial person” within the law (Bakan 2004). In other words, corporations have certain rights, duties, and responsibilities as if they were individual citizens in the civil society. Shareholders normally own corporations, while directors and managers normally have a fiduciary duty or responsibility to serve shareholders’ values and interests. Importantly, a person has a sense of moral or social responsibility for his/her actions; however, this is slightly different from assigning a moral responsibility to corporations (Crane and Matten 2016).

The major responsibility of the profit-making organizations is to maximize the profits of shareholders or owners (Friedman 1970). The debate of corporate responsibility has been discussed over the past decades. Karnani (2010) argues three important concerns for corporate responsibility: (i) only individuals have a moral responsibility for their actions, (ii) managers’ responsibility is to act primarily for shareholders’ interests, and (iii) social problems and environmental issues are not the job of managers who are not trained to accomplish social goals. However, some proponents contend that corporations can be morally responsible for their actions based on four considerations. First, corporations have a legal identity as they comply with local legal requirements, such as job creation, tax payment, and product safety, as a form of legal responsibility (Carroll 1991). Second, corporations

have an internal decision structure which is shown in the form of corporate policies, practices, and procedures that will meet the predetermined organizational goals, thus the internal decision structure can be referred to groups or individuals within corporations (Crane and Matten 2016). Third, organizational culture is another argument for moral dimension of corporations as organizational culture can be seen as a set of core values and beliefs that delineate what is wrong and right in the corporation (Moore 2004).

However, the debate about nature of corporate responsibilities is not limited to shareholders only but extends to a wider group of stakeholders (Freeman 1984). Then, corporate responsibility was regarded as management practice in 1980s. Then, corporations developed frameworks for corporate social performance, environmental management, and stakeholder partnerships to address several social and environmental issues, such as poverty, social equality, and environmental sustainability (Blowfield and Murray 2014).

Stakeholders can be identified based on three attributes: legitimacy, power, and urgency (Mitchell et al. 1997). From an instrumental perspective, corporate managers have been advised to serve the best interests of legitimate and powerful stakeholders with urgent demands (Mitchell et al. 1997), but there are alternative perspectives or approaches. Stakeholder analysis thus can involve three different approaches: descriptive, instrumental, and normative (Donaldson and Preston 1995). Within market economies, profit-seeking organizations appear to adopt an instrumental approach in setting out to placate major stakeholders who might otherwise jeopardize their business survival. This instrumental approach of stakeholder analysis and management is often known as “the business case” for corporate social responsibility (CSR). Multinational companies (MNCs) thus adopt CSR as a means to continue to create shareholder value (Friedman 1970), gain competitive advantage (Porter and Kramer 2002), reputation and legitimacy, reduce costs and risks, synesthetic value creation (Kurucz et al. 2008), diffuse potential scandals regarding supply chain management (Maloni and Brown 2006), and maintain governmental relationships (Gond et al. 2011).

The arguments against CSR are due to three main reasons: (i) business is not equipped to address social problems, (ii) CSR dilutes the primary purpose of business operations, and (iii) CSR makes business less competitive in the global economic environment (Carroll and Shabana 2010). By contrast, there are several arguments in favor of CSR that (i) corporations engage in CSR in order to enlighten self-interest in a long-term; (ii) corporations initiate self-disciplined and voluntary standards to forestall to the future government regulations (Carroll and Shabana 2010); (iii) corporations have resources, such as capital, expertise, and professionals resolve social and environmental problems in the unsustainable world (Davis 1973); and (iv) CSR could enhance corporations to be proactive rather than reactive or responsive to social problems, environmental incidents, and unforeseen crises (Carroll and Buchholtz 2009).

Domestic and multinational companies have been involved in a spate of corporate scandals, such as product safety, labor exploitation, and climate change issues (Noronha et al. 2015). Investors appear to lose their trust and confidence in global companies offering their major products and services in their daily lives. Therefore, a growing body of shareholders has gradually included ethical, social, and environmental concerns in their investment portfolios as risk assessments or risk management. This trend is predominantly due to several contributing factors, such as higher stakeholders expectation, stakeholder engagement on CSR or sustainable development, and voluntary or mandatory practices (Leung 2015; Leung and Gray 2016; Leung and Snell 2017), the growing importance of shareholder activism, shareholder resolutions, and institutional shareholding on a range of ethical, social, and environmental issues (O'Rourke 2003; Katz and McIntosh 2015).

Shareholder activism is generally regarded as an attempt to use shareholder rights to change corporate policies and practices (Crane and Matten 2016). Conventional shareholder activism generally focuses on the interests of shareholders and emphasizes corporate governance (Dimson et al. 2015). Prior studies suggest that maintaining good corporate governance is essential for enhancing shareholder wealth and value (Becht et al. 2009). In stark contrast, however,

shareholder activism places a high emphasis on the interests of wider stakeholder groups, such as customers, employees, and suppliers, and even the silent stakeholder, namely the environment (Dimson et al. 2015). Arguably, the role of organizations is so powerful and influential in the modern business society. Thus, shareholder activism is seen as an individual level that could play a significant contribution to sustainable development.

The increasing number of shareholder activism proposals and approval rates, particularly regarding social and environmental issues filed with the US Securities and Exchange Commission (SEC), has gradually increased over the last 10 years (Katz and McIntosh 2015). Notably, there are 417 shareholder resolutions on social and environmental issues in the USA (Crane and Matten 2016). However, raising CSR and sustainable development issues at the Annual General Meeting (AGM) would need the support and participation of larger institutional investors (Taylor 2000) and shareholder resolutions are expensive and resource intensive (O'Rourke 2003). Shareholders could use their power and ownership rights to encourage companies to incorporate the triple bottom line of sustainability to become corporate citizens. With this strategic approach, shareholders could develop win-win and triple wins situation for business operation.

## Final Remarks

In short, the first part provides an overview of four traditional normative and four major contemporary ethical theories in relation to personal social responsibility. There is no single ethical theory that dominates in the modern society; however, these theories are seen as lens or prism to help individuals to examine moral responsibility or social responsibility. The second part extends the link from personal social responsibility to ethical leaders in the business setting in general and shareholder activism in particular. These two prevalent business practices have been widely adopted in the modern business operation that could play some parts in achieving sustainable development.



## Cross-References

- ▶ [Corporate Social Responsibility](#)
- ▶ [Investor Activism Towards Sustainability](#)
- ▶ [Leadership](#)

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## Perspectives

- ▶ [Dimensions of Sustainability in Higher Education](#)

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- ▶ [Serious Games and Sustainability](#)

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## Pluridisciplinarity

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## Points of View

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## Pollution Prevention for Sustainability

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### Introduction

Prevention, in a broad sense, can be defined as “actions taken to influence potential causes of adverse effects and thereby avert those effects” (Hirschhorn et al. 1993). This is just one of the countless definitions and terms related to sustainable development that may cause confusion since many of them may be synonymous or be strongly related with slight differences depending on context or the geographical area in which they are used (Glavič and Lukman 2007).

This article aims to describe the basic elements of the *pollution prevention* concept and how it has evolved over time to its current position in sustainable development. Through a literature review, the root of the concept is first underlined, including its evolution from the control approach through key periods of time. The development of pollution prevention is then depicted, including a basic framework and how it relates to other approaches. Finally, the main elements and tools of a pollution prevention program are described.

### The Root of the Concept

One factor usually associated with pollution is *externality*, which, although occasionally positive, usually refers to the costs resulting from producer or consumer actions that are not reflected in market values. Thus, if a company has no incentives to control or prevent pollution, polluting is a free resource for the companies that is usually paid for by others – society, for instance (NPPC 1995). Another concept associated with environmental

impact is *assimilative capacity*, which emphasizes that a certain level of activity may be allowed as long as it does not lead to unacceptable impact to the environment or human health since these impacts can be avoided by controlling the manner, time, and rate at which pollutants enter the environment (Hirschhorn et al. 1993).

Pollution has long been addressed in a variety of ways. However, a new period was inaugurated in the 1970s. Lasting until the mid-1980s, this period was associated with the development of environmental pollution control approaches involving legislation and initiatives (Keijzers 2002). The main approach used to address environmental issues was *command-and-control*, in which government agencies established mandatory standards and methods for compliance leaving companies with limited incentives to explore alternate ways to reduce pollution (NPPC 1995; UNIDO 2002). Within this period, one of the options usually suggested was *end-of-pipe* treatment, which includes the “application of chemical, biological, and physical processes to reduce toxicity or magnitude of environmentally undesirable compounds in process waste streams prior to their release to the environment” (El-Halwagi 1998). Filters, scrubbers, cyclones, condensers, and catalytic combustion equipment are good examples of end-of-pipe technologies. Unfortunately, the need for the proper disposal of the residues generated by these waste treatment methods persists and may eventually lead to the dispersion of pollutants into natural ecosystems (Lindsey 2011).

Additionally, disposal strategies included post-process activities like deep-well injection and the off-site shipment of hazardous materials to waste management facilities (El-Halwagi 1998). Pollution control methods, such as end-of-pipe treatments, usually have shifted the impact of pollution from one environmental medium – air, water, or land – to another by placing the pollution somewhere else, like in a landfill (Hunt 1995; NPPC 1995). At this stage, pollution prevention emerges as a countermeasure to end-of-pipe treatment or remedial action. As a result, the accepted way to deal with pollutants has progressively expanded from one in which no attention was given to the fate of contaminants after they were

released into the natural environment or to the negative impacts of this practice at a local, regional, and global scale to one based on source reduction (Mihelcic et al. 2003).

Thus, another period can be seen between the mid-1980s and the present, in which the prevention approach emerged and matured. At the beginning of this period, waste recycling and energy recovery developed, and, at the end of the 1980s, resource conservation, risk reduction, and pollution prevention gradually gained more prominence, eventually transitioning toward cleaner production and eco-efficiency in the 1990s (Keijzers 2002; UNIDO 2002). A related concept to pollution prevention that emerged in the 1970s but gained attention in this period is the precautionary principle, which was incorporated into the Rio Declaration in 1992 as follows (UNESCO 2005, p. 12):

In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.

A philosophical shift and a record of accomplishments were two important elements of environmental management through pollution prevention (Overcash 2002), which enables the internalization of costs associated with externalities (UNIDO 2002) and aims for the prevention of cross-media transfers by eliminating waste streams (Allen et al. 1992). Pollution prevention is thus considered both a socioeconomic and a technical strategy that identifies upstream causes of pollution (Hirschhorn et al. 1993). This scheme is founded on the realization that pollution results from the generation of waste; consequently, preventing waste from being created in the first place becomes the main priority (Elleuch et al. 2018).

## Pollution Prevention Development

In the umbrella of prevention, many terms are often used as rough synonyms with subtle differences that depend on the audience being

addressed (Overcash 2002). These terms include, for instance, cleaner production, pollution prevention, waste minimization, waste prevention, and eco-efficiency, the variations between which, for practical purposes, are considered minimal (Hirschhorn et al. 1993; UNIDO 2002).

For example, pollution prevention and cleaner production are commonly used interchangeably, and their application depends upon the context (EPA 1998; UNIDO 2002). On the one hand, cleaner production is the preferred term for pollution prevention in Europe (Tickner and Wright 2002); on the other hand, cleaner production can emphasize the manufacturing sector, while pollution prevention may apply to every sector with either small or large operations (EPA 1998).

In contrast, van Berkel (2000) considers pollution prevention an earlier stage of cleaner production since the latter comprises a more wide-ranging analysis of environmental impacts, explicitly addressing the conservation of materials, energy, and other natural resources, though neither pollution prevention nor cleaner production addresses sustainable development's social equity objectives.

One of the most popular definitions of pollution prevention comes from the US Environmental Protection Agency (EPA 1990, p. § 13102), which terms it "source reduction," meaning any practice that:

- (i) reduces the amount of any hazardous substance, pollutant, or contaminant entering any waste stream or otherwise released into the environment

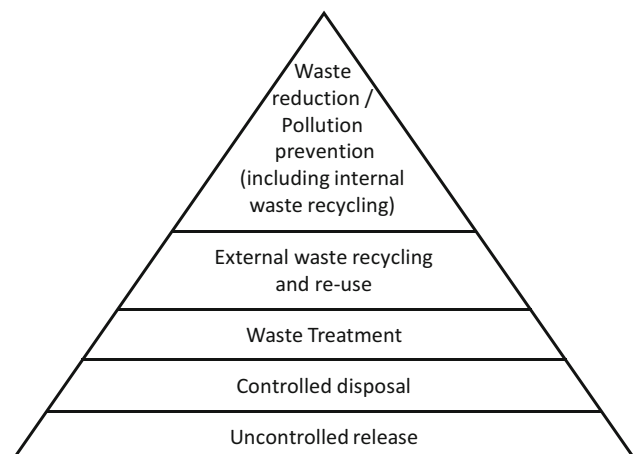
(including fugitive emissions) prior to recycling, treatment, or disposal; and (ii) reduces the hazards to public health and the environment associated with the release of such substances, pollutants, or contaminants.

As a counterpart, in 1996, the European Union (EU) released the Integrated Pollution Prevention and Control (IPPC) Directive, through which pollution prevention and control must be carried out through the best available techniques (BAT) aimed at preventing and/or reducing emissions and the impact on the environment as a whole (Vivian 1997; Martinez 2006). This directive addresses sustainable development's *triple bottom line* of environmental, economic, and social concerns (Martinez 2006).

A widely accepted hierarchy of waste management options, shown in Fig. 1, runs from waste reduction or pollution prevention as top priorities to uncontrolled disposal as the less preferred option (Hirschhorn et al. 1993). Overcash (2002) conceptualizes this hierarchy as three levels. At the top of the priorities is waste minimization as pollution prevention, which includes (a) process modification and (b) recycle and reuse. In the middle level is the conversion of hazardous waste to less or non-hazardous waste, including (a) land treatment, (b) incineration, (c) thermal treatment, (d) chemical, physical, and biological treatment, and (e) ocean and atmospheric assimilation. At the bottom of the priorities is perpetual storage, which includes (a) landfills,

### Pollution Prevention for Sustainability,

**Fig. 1** A hierarchy of waste management options. (Source: Adapted from Hirschhorn et al. (1993))



(b) underground injection, (c) waste piles, (d) surface impoundments, (e) salt formations, and (f) arid region unsaturated zones.

One of the earliest initiatives that is considered a hallmark for preventive programs is the Pollution Prevention Pays program introduced by the company 3M in the mid-1970s and promoting the reduction of waste and pollution as cost-reduction strategies. The conceptual basis of this program spread worldwide through the United Nations Environment Programme's Cleaner Production Programme (Berger 2000; van Berkel 2000).

Pollution prevention measures can be promoted in two basic ways: through regulatory standards enforced by state or federal government entities, through which the precautionary principle permeates, or through voluntary programs, like ISO 14001-based environmental management systems, which are enacted by suppliers, facility owners, and employees, each gaining some benefit (Enander et al. 2003; Tickner and Geiser 2004).

The economic benefits of pollution prevention are evident because its implementation leads to the increase of process materials and energy efficiencies, the valuing of resources, and the elimination of costly investments derived from waste management or cleaning. All this results in decreasing production costs (Dorfman et al. 1993). Additional advantages include the reduction of both potential liabilities and the enormous costs associated with remediation sites where severe threats to human health are latent (Dorfman et al. 1993; Keoleian 1994). Furthermore, pollution prevention may underpin an international commitment to enhance the quality of the worldwide environment (Freeman et al. 1992).

### **Pollution Prevention and Work Environment**

Usually, the release of hazardous chemicals occurs in both directions, external to companies, affecting the environment and communities, and inside the plants where workers are continuously exposed (Armenti et al. 2011). Pollution prevention not only protects the community through a healthier environment but also protects workers (Freeman et al. 1992).

For pollution prevention initiatives, worker involvement is very important since they know about the daily activities that involve the production processes and products that, in some way, may affect their health (Tickner and Wright 2002). Thus, the shift from end-of-pipe controls to pollution prevention should promote, as part of an integral public health strategy, primary prevention in work places (Armenti et al. 2011). Although regulations on work environment have traditionally allowed some "acceptable" or "permissible" risk level or acceptable threshold for pollution release, prevention currently seems like a suitable approach for human health preservation in workplaces and in society in general (Enander et al. 2003).

### **Prevention as Part of Sustainability**

The need to preserve the natural environment is not exclusively focused on reducing or eliminating the harm caused by poor waste management and the discharge of contaminants. The unwise and reckless use of natural resources, ultimately leading to their quick depletion and even exhaustion, was addressed in the document *The Limits of Growth Report* as a factor capable of imposing significant limitations on the industrialization process in third world countries (Meadows et al. 1972). Moreover, a definition of sustainable development as development which "meets the needs of the present without compromising the ability of future generations to meet its needs" was provided by the Brundtland (World Commission on Environment and Development 1987). Later, *Agenda 21*, a document released during the first Earth Summit held in Rio de Janeiro in 1992, defined a set of goals pertaining to the environmental, social, and economic arenas as ways to address global environmental problems (Mihelcic et al. 2003).

As a result, the concept of sustainability emerged as the need for and benefits of implementing a holistic approach to meet environmental challenges, and it eventually took hold among international organizations and academia. This concept developed from the recognition that the adverse effects of an inappropriate or excessive use of natural resources in transformation and

production activities may lead to the elimination of economic opportunities, damage human health, and create a negative social impact in the present and future. Awareness also rose of the potentially harmful consequences at not only a local but also at regional and global scales.

Although broad support, either explicit or tacit, for the promotion of practices deemed to be in conformity with sustainable criteria seems to be present in academic circles and among the general public, there is still much controversy regarding the manner in which such principles can be successfully implemented. Nevertheless, the incorporation of pollution prevention and cleaner production as integral elements of a sustainable approach can be seen as a logical step given their similarities in final objectives and operational practices.

However, learning how waste is produced and how it can be prevented through pollution prevention is an essential step toward sustainability (Elleuch et al. 2018). In other words, pollution prevention helps achieve global sustainable development while minimizing the overall environmental burden associated with meeting our needs and increasing the efficiency of material and energy use (NPPC 1995).

### Barriers

There are still environmental policies, regulations, and fiscal instruments with command-and-control approaches that encourage end-of-pipe measures, favoring pollution control over pollution prevention (Byers 1991; Paras 1997). Among the many barriers that have been identified as deterring pollution prevention initiatives are the lack of man-hours involved in pollution prevention programs, a perception of the high cost of pollution prevention implementation, its low priority among business owners, a lack of awareness and interest, a lack of regulatory enforcement, and a lack of strategic direction and organizational structure for pollution prevention programs (NPPR 2003). In particular, moving toward a less toxic materials system can be perceived as a threat to chemical manufacturers whose products are potential pollutants (Geiser 1993). Furthermore, pollution

prevention might not be automatically perceived as an important element of sustainability because (UNEP 2001, p. 25):

Sustainable development is about systems, while pollution prevention tends to focus on components, seldom generating a comprehensive perspective; sustainable development is about equity, while pollution prevention remains silent about issues of poverty, social equality and human justice; sustainable development is about consumption, while advocates of pollution prevention have championed the ideas of sustainable consumption, with limited practical advice.

### The Pollution Prevention Program and Tools

A manual developed by the Illinois Hazardous Waste Research and Information Center, *Pollution Prevention: A Guide to Program Implementation* (Case et al. 1995), claims that for a pollution prevention program to be effective, a meticulous continued reduction strategy for all waste produced by a facility must be established, along with procedures to achieve such a goal in a systematic fashion based on priorities. Several elements must be considered when developing a pollution prevention program. One is the pollution prevention plan. This serves as a guide that delineates in a detailed manner the way the program should be implemented and enables closely monitoring its development. The plan should also identify the pollution prevention team, which conducts the waste characterization and pollution prevention evaluations. Finally, projects must include specific activities to eliminate or reduce waste.

Furthermore, such a manual has been adapted by many organizations in different contexts for both pollution prevention and cleaner production initiatives (Freeman 1995; EPA 2001; UNIDO 2002; IRG – USAID 2006), and, although some adjustments with variations in the number of steps have been made to the methodology in different circumstances, the following eight steps can be considered a basis to establish and maintain a pollution prevention program:

1. Top management support. Top management support is essential for ensuring that pollution prevention becomes an organizational goal.
2. Getting started. Get the program started by beginning to incorporate changes throughout the company, developing a written pollution prevention plan, and training employees in pollution prevention.
3. Characterize the processes. Review and describe in detail the manufacturing processes within the facility to determine the raw materials used and the sources of waste generation to define a baseline inventory that can be used to set goals and evaluate progress.
4. Assess waste and identify opportunities. Identify potential pollution prevention opportunities for the facility.
5. Cost considerations. Determine the cost of current waste generation, and establish a system of proportional waste management charges for those departments that generate waste.
6. Identify and implement options. Select the best pollution prevention options for the company, and implement these choices.
7. Program evaluation. Evaluate the pollution prevention program on a companywide basis and in relation to specific pollution prevention projects.
8. Sustain program. Maintain and sustain the pollution prevention program for continued growth and benefits to the company. Reevaluate the program as economic situations change and/or the equipment used in the process requires upgrading.

There are also several source reduction techniques (EPA 1998), as shown in Table 1, that are commonly used for pollution prevention and that consider the factors that have been identified to determine the volume and composition of waste streams and emissions – namely, the product, input materials, waste and emissions, technology, and process execution (van Berkel et al. 1997).

**Systems Approach Tools for Pollution Prevention**

An organization acts as a system that functions through the interaction of its parts. This

**Pollution Prevention for Sustainability, Table 1** Source reduction techniques for pollution prevention

Source reduction technique	Description
1. Process efficiency improvements	A method of doing more with less by designing new systems or modifying existing ones; the most effective means of conserving materials and resources
2. Material substitution	Replace hazardous chemicals with less toxic alternatives of equal performance
3. Inventory control	Reduce product losses due to product expiration and overstocking
4. Preventive maintenance	Includes any activity that might prevent equipment malfunctions and environmental releases
5. Improved housekeeping	Keeping a clean shop conserves resources and materials, prevents product losses, and prevents spills and leaks
6. In-process recycling	In-process recycling is considered source reduction if materials are not removed from the process (i.e., waste is not generated) or if materials are redirected back into the process

Source: EPA (1998)

functionality of the parts depends on how they are connected, directly or indirectly; consequently, any change in one of the parts may affect all the others; therefore, tools are needed that address an organization’s complexity (EPA 2001). The systems approach for pollution prevention uses structured problem-solving and decision-making tools designed to be used by teams rather than by individuals (Włodarczyk et al. 2000).

The following table describes the systems approach tools for pollution prevention implementation, the visual nature of which improves communication between management and workers (Pojasek 2002). Nevertheless, many other tools and techniques can be used according to each particular organization’s needs and were not included in this article (Table 2).



**Pollution Prevention for Sustainability, Table 2** Pollution prevention tools

Tool	Description
Process mapping	A process map is a schematic depiction of a process that is prepared by a team consisting of people from several departments
Determining the cost of the loss	Gathering accurate cost information is important for justifying investment in pollution prevention alternatives. Three types of costs can be identified: general ledger costs, cost of the lost resources, and activity-based costs associated with the management of the nonproduct loss
Selecting pollution prevention opportunities	If all the pollution prevention opportunities identified in the process maps were arranged in order of their true cost to the organization, the 20% of the opportunities provide approximately 80% of the cost benefits, usually through Pareto diagrams
Analyzing root causes	Root cause analysis refers to the process of identifying causal factors. If this cause can be eliminated, the resource use or loss would be prevented. The cause and effect – Ishikawa – diagram can be used for this analysis
Generating alternative solutions	The only way to find a good pollution prevention alternative is to have many pollution prevention alternatives. A method for generating alternatives is brainstorming, a technique similar to brainstorming, but tends to be less restrictive, since participants write down their ideas rather than say them
Selecting an alternative for implementation	Selecting a pollution prevention alternative for implementation is facilitated with decision-making tools such as a criteria matrix or bubble-up/bubble-down
Action planning	A formal action plan should be prepared for every pollution prevention activity that is planned. Each action plan should list the alternative that will be implemented and show the sequence of steps necessary to implement the alternative

Source: Pojasek (1997, 2003, 2005) and EPA (2001)

## Conclusion

Taking care of the environment has been a long learning and adaptation process. From only a few decades ago, society had just started to understand the importance of integrative and preventive approaches. As a core premise of pollution prevention, Freeman et al. (1992, p. 620) state that:

If no pollution is generated, there are no pollutants to be managed. Thus, future problems are avoided, such as the problems which occur when previously accepted land disposal methods are discovered to be major sources of environmental contamination.

The evolution toward pollution prevention can be considered a historic step (Geiser 1993) that, after the dispersion, control, and recycling approaches, constitutes the fourth stage in environmental management progress (van Berkel 2000). Currently, industries aim to reduce waste from its source and promote the reuse and recycling of materials by designing products that can be useful after their lifetime expires (Bishop 2000). However, recycling should not be an end in itself since it still consumes energy and resources (Bartl 2014). Although pollution prevention and other related approaches are key elements of reducing the use

of toxic materials, a cleaner and safer production system is required to redirect our capacities toward sustainable societies (Geiser 1993). The array of opportunities depends on our creativity and imagination, as well as the responsibility we feel toward the environment (NPPC 1995).

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“A technique for assessing the environmental aspects and potential impacts with a product by:

- Compiling an inventory of relevant inputs and outputs of a product system,
- Evaluating the potential environmental impacts associated with those inputs and outputs,
- Interpreting the results of the inventory analysis and impact assessment phrases in relation to the objectives of the study.”

## Introduction

The consumption of goods, including products or services, is inevitable in our society today. The provision of goods always has a direct impact on the environment, regardless of whether the goods are made available on an industrial scale, as manual work or in the form of a service. It is the task of the Life Cycle Assessment (LCA) to determine which environmental burdens arise and how these are dealt with in detail. The LCA is the breakdown of all substeps from the beginning to the end of the life cycle (cradle to grave) of the considered good. Both individual process steps can be investigated in order to detect and optimize the emission of pollutants and waste, or it can be – and this is the most frequently used purpose – products or services compared with each other. A conventional example which is also used for educational purposes is the comparison of the environmental effects of coffee preparation in coffee machines or as filter coffee (Chayer and Kicak 2015).

The first thoughts on LCA's, in the modern sense, originated in the USA, towards the end of the 1960s and the beginning of the 1970s. Harry E. Teasley Jr., then Head of Packaging at Coca-Cola, analyzed the amounts of energy and materials and their environmental impact from the obtaining of raw materials to the landfill. The results of his records, he brought to the *Midwest Research Institute* (MRI), under the direction of a study developed and published for Coca-Cola. Decisive for all further LCA studies was the concept of Hunt & Franklin (1996), who

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## Polydisciplinarity

- ▶ Multi-disciplinarity

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## Possibilities and Limits of Life Cycle Assessment in Sustainability Reviews

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### Definition

In the ISO 14040: 2016, the definition of an LCA was given as:

developed the methodology at the MRI. However, the results of the Coca-Cola study were never published but only used internally. Before using the term “LCA,” the term “*resource and environmental profile analysis (REPA)*” was used since the 1970s (Hunt and Franklin 1996). The first European studies also dealt with beverage packaging (Oberbacher et al. 1996; Boustead 1996).

The path to today’s standardized form of LCA studies began in the 1990s under the leadership of the *Society for Environmental Toxicology and Chemistry (SETAC)*. The working groups developed methods for carrying out an LCA study. That culminated in the 1993 SETAC workshop in Sesimbra, Portugal. As a result, SETAC published in the same year the “Guidance for Life Cycle Assessment: A Code of Practice” (Perriman 1993) and thus formed the predecessor of today’s ISO 14040 ff. Norm. Unlike the early years, LCA studies today are created by computer programs that can access a variety of databases (Joint Research Center European Platform on Life Cycle Assessment EPLCA 2017). Even if the databases are constantly being extended and improved, not all areas are covered, so creating a study requires in-depth knowledge of the individual process steps in order to record all the parameters.

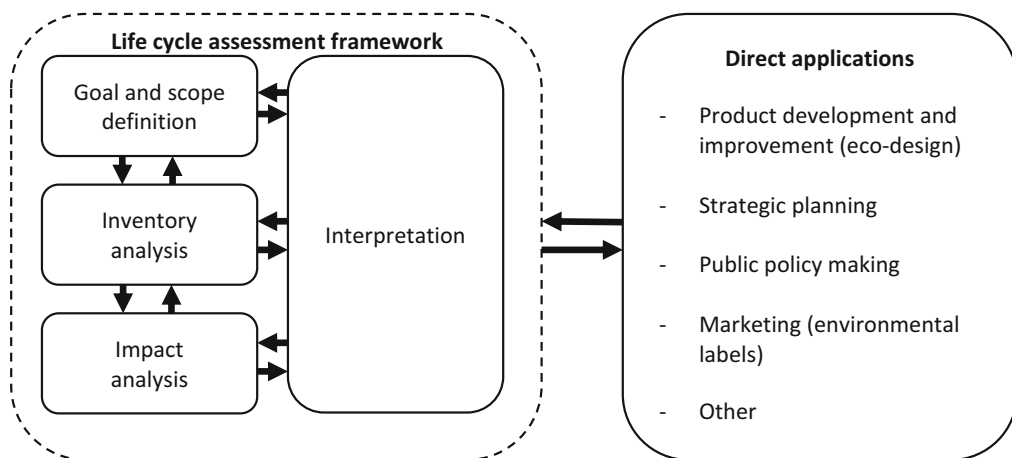
## Life Cycle Assessment Approach

When performing an LCA, the entire life cycle is considered through the various steps of refining the product until its disposal, beginning with the exploration (extraction of raw materials). The results then relate to the environmental aspects and their environmental effects [ISO 14040:2006, ISO 14001:2015]. The LCA is an iterative process, pending its final completion, both within the individual accounting phases and throughout the study (ISO 14040:2006). The basic set of rules for performing an LCA are provided in ISO 14040:2006, which describes the basic conditions, and ISO 14044:2006, which defines the requirements for the generation of the LCA.

### ISO 14040:2006 Framework

The preparation of an LCA is divided into four areas that each study must contain, with the individual phases being interrelated (Fig. 1) and structured as follows:

- Definition of the objective and the scope of the investigation
- Inventory analysis
- Impact assessment
- Evaluation



**Possibilities and Limits of Life Cycle Assessment in Sustainability Reviews, Fig. 1** Stages of an LCA according to ISO 14040:2006

Depending on the defined goal and frame, the results of an LCA study contribute to decision-making in different applications. LCA might be applied, for example, in the development of new products in policy recommendations (e.g., LCA for beverage packaging as a decision-making aid of the Packaging Ordinance (National Environmental Agency 2016)), or the evaluation of business units in a company. Statements about the sustainability of a good (product or service) cannot be made because the LCA does not consider economic and social impacts.

The results allow only conclusion on the potential environmental impacts, precise predictions or exact environmental impacts assessments are not the scope of an LCA. The reasons according to ISO 14040:2006 are:

- The result is related to a reference unit (*functional unit fU*)
- Temporal and spatial change of environmental data
- Modelling of environmental impacts always warrants uncertainties
- Potential effects will only be apparent in the future

**Product System**

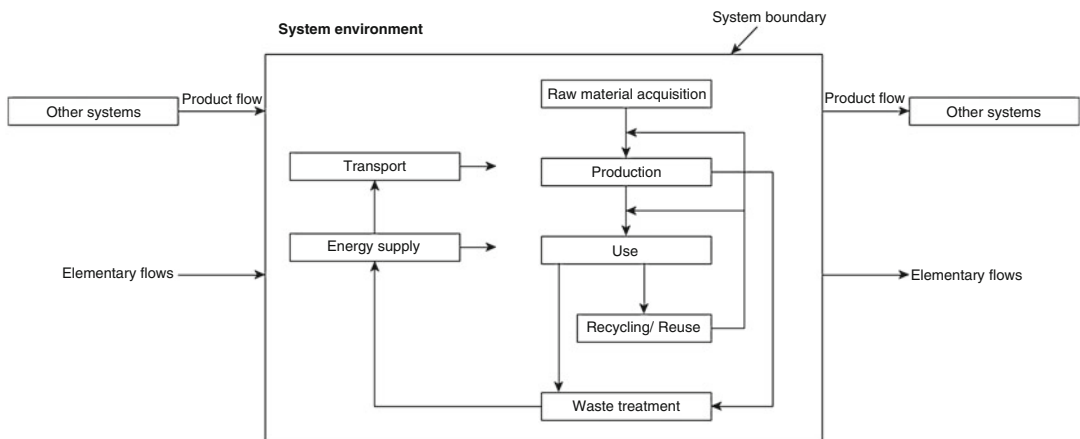
The life cycle chain of a product or service is designed in the form of a flow chart as an LCA

product system (Fig. 2). Within the product system, individual process modules are considered that represent the smallest unit with their input and output flows. This subdivision creates a simple model in which the respective inputs and outputs are determined. Elementary flows that are delivered to the product system, are either material or energy flows that are converted into emissions through the steps of the process modules and released to the environment, soil, water, or air, respectively.

**Goal and Scope Definition**

The first step in performing an LCA is the definition of the goal and framework of the study. Since this is an iterative process during the procedure, the goal and frame may change as the process progresses. However, these must always be tailored to the concrete relationship to the study. Furthermore, the following contents according to ISO 14040:2006 and the resulting questions must be part of the LCA:

- Intended purpose: What should be investigated in the study?
- Reasons for implementation: What purpose is intended?
- Targeted audience: To whom is the study directed?
- Publication: Is a publication planned and is it intended for comparative statements?



**Possibilities and Limits of Life Cycle Assessment in Sustainability Reviews, Fig. 2** Product system for LCA according to ISO 14040:2006



These key issues determine how detailed the study has to be in the first phase. Since ISO 14040:2006 does not comment on the investigation depth, it is the task of the user to determine the accuracy in order to fulfill the respective task. The phase of the impact assessment has a special significance in the definition, since this can be designed very flexibly and adapted exactly to the needs of the user and his question. Furthermore, the framework contains the system boundaries and thus describes all process modules that are considered for the study. It also lists the functional unit, assumptions, data quality, and limitations.

### Functional Unit

The central element of an LCA is the functional unit (fU), since all results relate to it. The user ensures that the in- and output flows relate to a reference quantity that can be chosen relatively freely. If an LCA examines, for example, open-cast mines for sand-lime bricks, it does not matter whether the company refers to 1 t of sand-lime brick or 1 million t of lime-sandstone, since the results differ in their powers of ten. If this is a comparative study, the fUs must be the same. It is therefore of great importance that the user is clearly committed at the beginning, that is during the definition of objectives and frameworks.

Furthermore, the reference flow must be precisely defined. According to ISO 14044:2006, the reference flow contains the processes within the product system which are required to produce the functional unit. For the production of lime sandstone, for example, the extraction of the rock (blasting), the transport within the opencast mine, as well as crushing, processing, and washing. Thus, those process modules are listed that are needed to produce the fU.

### Life Cycle Inventory Analysis (LCI)

The Life Cycle Inventory is the second level when performing an LCA, in which all material and energy flows (in- and output flows) of the process modules are recorded and compiled (Table 1). The data of the process modules can be either determined by directly measuring, calculating, or estimating. If estimates are made in the LCI, these must

**Possibilities and Limits of Life Cycle Assessment in Sustainability Reviews, Table 1** LCIA limestone: an extract from the German Environmental Agency data base for limestone (Umweltbundesamt 2012)

Input	Amount	Unit
<b>Resources</b>		
Land occupation	3.19E-6	m <sup>2</sup> /t
Water consumption	2.36	l/t
Energy		
CED, fossil	23.7	MJ/t
CED, nuclear	0.404	MJ/t
CED, renewable	0.208	MJ/t
<b>Output</b>		
<b>Emissions</b>		
CO <sub>2</sub> , fossil	1.65	kg/t
Ethen	1.5E-6	kg/t
N <sub>2</sub> O	2.91E-4	kg/t
SF <sub>6</sub>	4.31E-9	kg/t
SO <sub>x</sub> (as SO <sub>2</sub> )	2.56E-4	kg/t
<b>Output</b>		
<b>Waste water</b>		
NH <sub>4</sub>	16,5E-6	kg/t
Sulfates (as SO <sub>4</sub> )	4.23E-4	kg/t
Sum phosphorus (as P)	4.54E-6	kg/t

be justified and documented, as well for values derived from literature references.

For a simple representation of the process modules involved in the product system, a flow chart should be created (Fig. 5). Furthermore, standardized data sheets (e.g., ISO 14044 Annex A) should be used to record all material and energy flow occurring in the process, which at the same time contribute to uniform documentation. The inputs collected (inputs, raw materials, supplies, energy, etc.) and outputs generated (products, emissions, waste, etc.) are then summarized for subsequent computation and validation. The calculation relates the LCIA values to the functional unit.

Often, however, not all material and energy flows of a process module can be detected, since the individual steps for data acquisition are too costly. For example, for transportation in an open cast mine, fuel is needed, which is made by the refining of crude oil. Since fuel is also needed in other LCA performances outside the respective study, it is too costly for any new study to investigate those data. For this reason, generic data



(background data) are used in such cases. These are always specifically defined values of the material and energy flows, which are prepared in such a way that they can be used for the description of a process module (Klöpfler and Grahl 2014). The use of generic data is indispensable in an LCA study because, as already shown in the above example, the collection of data for each new LCI would be far beyond an affordable effort.

The provision of such data is usually done via databases, which are either provided independently or are already part of a software. The range of databases extends from special to general data sets. Examples include:

- Plastics Europe, provided by Association of Plastics Manufacturers (<http://www.plasticseurope.org/plastics-sustainability-14017/eco-profiles.aspx>)
- European Life Cycle Database, provided by the European Platform on Life Cycle Assessment, Joint Research Center (<http://eplca.jrc.ec.europa.eu/ELCD3/>)
- ProBas, a process-oriented basic data for environmental management systems, provided by the National Environmental Agency of Germany (<http://www.probas.umweltbundesamt.de/php/index.php>)
- Ecoinvent, a data base provided by a not-for-profit association founded by institutes of the ETH Zürich University and the Swiss Federal Offices, Switzerland (<http://www.ecoinvent.org/home.html>)

For further use and processing of data sets, different software applications are used. It is important to ensure that the database is also compatible with the software used since not each program can process the contents of every database. Mostly the programs are able to implement several different databases. Some samples of software applications are mentioned here:

- OpenLCA, provided by GreenDelta GmbH (<http://www.openlca.org/>)
- Global Emission Model for Integrated Systems (GEMIS), provided by the International

Institute for Sustainability Analysis and Strategy (<http://iinas.org/gemis.html>)

- Umberto, provided by ifu GmbH Hamburg, Germany (<https://www.ifu.com/umberto/>)
- SimaPro, provided by PRé Sustainability from The Netherlands (<https://simapro.com/>)

## Life Cycle Impact Assessment (LCIA)

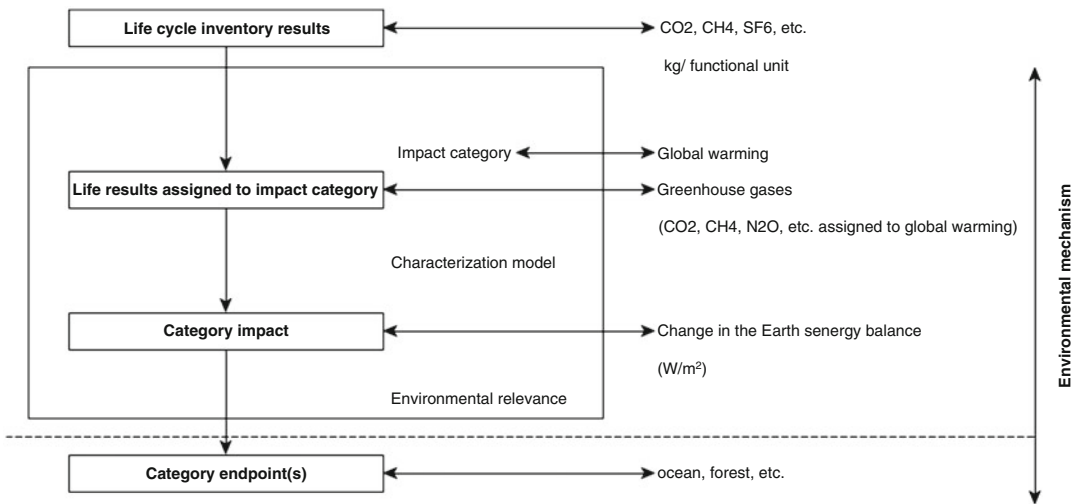
### General Approach to LCIA

The LCIA forms the third stage of the LCA, where the results of the Life Cycle Inventory are linked to the impact categories in such a way that the objective and the scope of the investigation are achieved. At the same time, the first utterances for the last step of the LCA, the interpretation, are being performed in this phase. The selection of impact categories is done in such a way that they are reconciled with the objective of the study. Different LCI data are calculated differently within an impact category since not every substance has the same environmental impact. The impact categories then refer to the impact indicator and further to the end efficacy(s), all of which are linked together through the environmental mechanism, that is the system of physical, chemical, and biological processes for a given impact category (Fig. 3).

In order to obtain a value for an impact category that emerges from the results of the LCI, the individual substances must be multiplied by factors and then summed up. This assigns each impact category a characteristic value, that is, a common entity. The basis for the calculation comes from scientific publications, such as the “*Fifth Assessment Report of the Intergovernmental Panel on Climate Change, 2013*” (IPCC 2013a). Table 2 shows an example of how the conversion of the LCI results into a uniform value takes place, whereas an overall result 3,365 kg CO<sub>2</sub>-Eq./fU was calculated.

### Methodologies for the Impact Assessment in the LCIA Stage

The results of the LCI thus directly related to the impact category, which is also referred to as the “midpoint category.” In order to determine the impact of a product, for example, on ecosystem quality or human health, sound knowledge of the



**Possibilities and Limits of Life Cycle Assessment in Sustainability Reviews, Fig. 3** Concept of category indicators according to ISO 14040:2006

**Possibilities and Limits of Life Cycle Assessment in Sustainability Reviews, Table 2** GWP values are an extract from the Fifth Assessment Report of the

Intergovernmental Panel on Climate Change (IPCC 2013b), LCI results, and characteristic value for an example of the CO<sub>2</sub>-Equ. calculation

Name	Chemical formula	GWP 100-years <sup>a</sup>	LCI result [kg/fU]	Characteristic value [Kg/CO <sub>2</sub> -Equ.]
Carbon dioxide	CO <sub>2</sub>	1	0.2	0.2
Methane	CH <sub>4</sub>	28	0.07	1.96
Nitrous oxide	N <sub>2</sub> O	265	0.001	0.265
Sulfur hexafluoride	SF <sub>6</sub>	23,500	0.00004	0.94

<sup>a</sup>GWP 100-years means that the chemical substance is x-times higher or lower by comparison CO<sub>2</sub> over a time horizon of 100 years

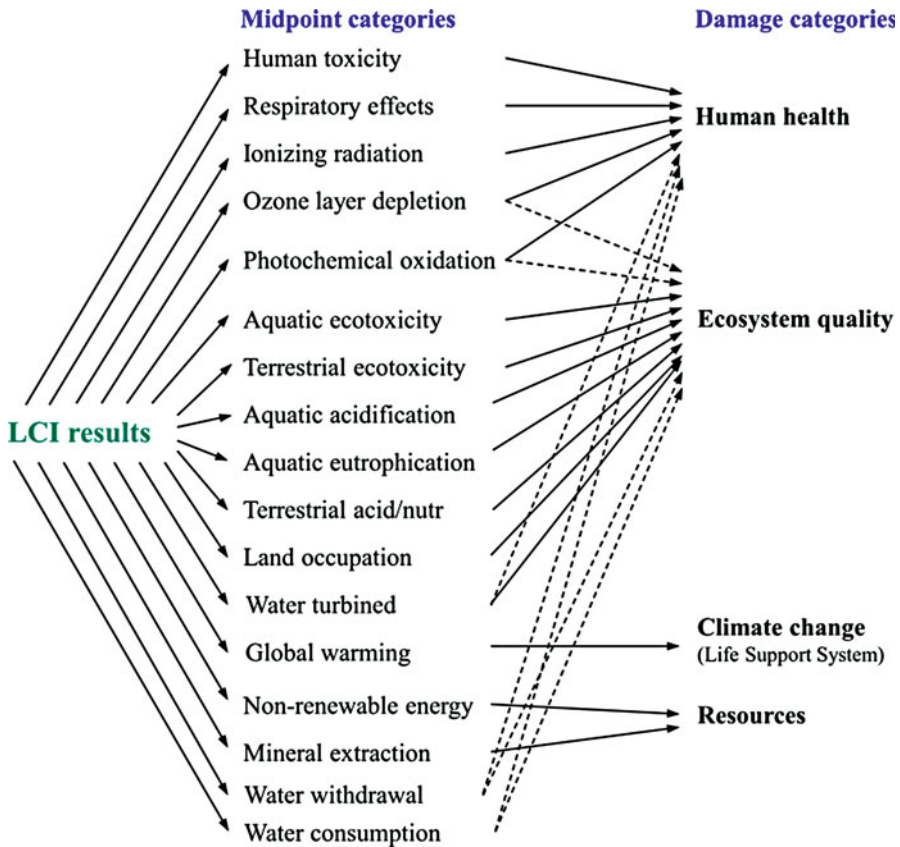
causal relationships is required. The “endpoint category” or “damage category” is then made up of several impact categories, since these are an interaction of different effects. Figure 4 shows a sample for midpoint categories and damage as of the IMPACT 2002+ framework (Humbert et al. 2012).

The development of today’s methods began in the 1990s, in the beginning, there were still pure midpoint categories and have been developed over time, such as the CML method of Leiden University, the Netherlands (Guinée 2012). According to ISO 14040:2006 and ISO 14044:2006, only the impact category used needs to be determined and described, the type of the method to be used remains the task of the LCA user. However, the selection should always

be made in line with the purpose and scope of the study. Table 3 gives an overview of commonly used methods.

**Life Cycle Interpretation**

The final stage of the LCA is the evaluation of LCI and LCIA results, in which a summary is drawn and the main points highlighted. These then lead to conclusions, restrictions, and recommendations (ISO 14044:2006). The formulations should be chosen in such a way that they are easy to understand and comprehend for the targeted audience. It should, therefore, be reflected in the evaluation that an LCA is relative. The results reflect the potential environmental impact and are not predictive of actual events (ISO 14040:2006).



**Possibilities and Limits of Life Cycle Assessment in Sustainability Reviews, Fig. 4** Scheme of the IMPACT 2002+ framework (Humbert et al. 2012)

**Possibilities and Limits of Life Cycle Assessment in Sustainability Reviews, Table 3** Commonly used LCA methods

Methodology	Description
IMPACT 2002+	The method currently includes 17 midpoint and 4 damage categories, with water turbined, water withdrawal and water consumption not being proper midpoint categories, but used to create better models. The focus here is on human toxicity and ecotoxicity (Humbert et al. 2012)
CML	Already in 1992, the method was published by the University of Leiden, the Netherlands, which is a midpoint categories approach. Two concepts are used: the CML baseline method with 11 categories and the CML nonbaseline which includes further categories (Universität of Leiden 2017)
ReCiPe 2016	It is an evolution of the ReCiPe 2008 method that currently combines 17 midpoint categories with three endpoint categories. The endpoint categories consist of human health, ecosystem quality, and resource scarcity. The maximum time horizon for a scenario can be up to 1000 years (Huijbregts et al. 2017)

### Differences Between Life Cycle Assessment (LCA) and Environmental Impact Assessment (EIA)

EIA is an environmental policy instrument of environmental protection with the aim of verifying environmentally relevant projects prior to

their approval for possible environmental impacts. As a rule, it is limited to verifying the impact on environmental factors. Economic and social consequences are not part of EIA. EIA is an environmental assessment report on how a project can affect environmental factors, like people (including human health), animals,

plants, biodiversity, soil, water, air, climate, landscape, and cultural heritage. The report is open to the public, the involved authorities, and other stakeholders, including neighboring countries (if applicable). Generally, EIA is regulated in the respective national environmental regulations. Further, at the scale of the European Union applies the EIA-Directive 2011/92/EU.

Even both approaches are environmental assessment methodologies, there are significant differences, which are summarized in Table 4.

While the LCA addresses the potential environmental impact of a product, EIA is concerned with the environmental impact of public or private projects (Table 4). The following effects are investigated for each individual case (2011/92/EU):

- Human, fauna, and flora
- Water, soil, air, land consumption, landscape, and climate
- Infrastructural and cultural assets
- Their interrelationships

Whether or not an EIA has to be carried out depends on the size of the project. Projects requiring an EIA are, for example, are nuclear power plants, airfields with a runway of 2100 m or more, open pits of more than 25 ha or thermal power plants of at least 300 MW (Annex I Directive

2011/92/EU). Other projects that are not listed in Annex I of the Directive but fall under Annex II are covered by the decision of the member states. In the screening phase, the decision is then made on a case by case basis or by thresholds or similar criteria.

The EIA is a key tool of European environmental policy to identify the environmental impact even before the start of a project (2011/92/EU) and to take measures to minimize the environmental impact or not to approve the project. One instrument in performing an EIA may be LCA.

### Practical Application of Life Cycle Assessment: LCA of Aluminum Foil

The following LCA provides an example that illustrates how to perform an LCA according to ISO 14040:2006 in a practical context.

#### Goal and Scope Definition

The goal of this study is to determine specific environmental impacts, material consumption, and energy consumption in the production of a roll of aluminum foil. Primarily, it should be shown how much energy is necessary to produce only a small amount of aluminum and to sensitize consumers.

The database for the production of the primary aluminum ingot casting of The Aluminum Association (2013) was used as one part of the data base for the LCA. It considers the primary aluminum production process in North America. For the further rolling process served a study of the Helsinki University of Technologie (2017). Energy supply and its production were described by ProBas datasets (ProBas 2017). The process of recycling and water treatment is also based on ProBas data.

The scope is following the production of aluminum foil, i.e. from bauxite mining to the rolling process and packaging. Due to gaps in the data collection, the distribution and the utilization phase are not considered. There are also gaps in application and recycling. This concerns the collection and processing of waste. Therefore, only the processing of aluminum scrap was considered for this phase. It

**Possibilities and Limits of Life Cycle Assessment in Sustainability Reviews, Table 4** Characteristics of LCA and EIA

Life Cycle Assessment (LCA)	Environmental Impact Assessment (EIA)
For the assessment of the environmental effect of goods	For the assessment of the environmental impact of plans, policies, and projects
Recommended standardized approach according to ISO 14040:2006	Regulated in European and national regulation
Assessment is referring to a product with its respective properties; voluntary; nonparticipatory	Assessment is anticipatory and participatory
Systematic in nature – quantitative	Systematic in nature – qualitative

should be noted that the manufacturing process refers to the typical technical processes in North America in 2010 and the resulting consumption.

The system boundaries include:

- Bauxite mining
- Bauxite, aluminum, and manufactured semi-fabricated products transportation
- Alumina production
- Electrolysis process
- Anode production
- Aluminum ingot casting
- Rolling operation
- Energy generation and supply
- Energy (heating, lighting) in the facilities
- Recycling/utilization

Excluded:

- Waste materials and their treatment
- Waste products recycling
- Cost of the facilities construction

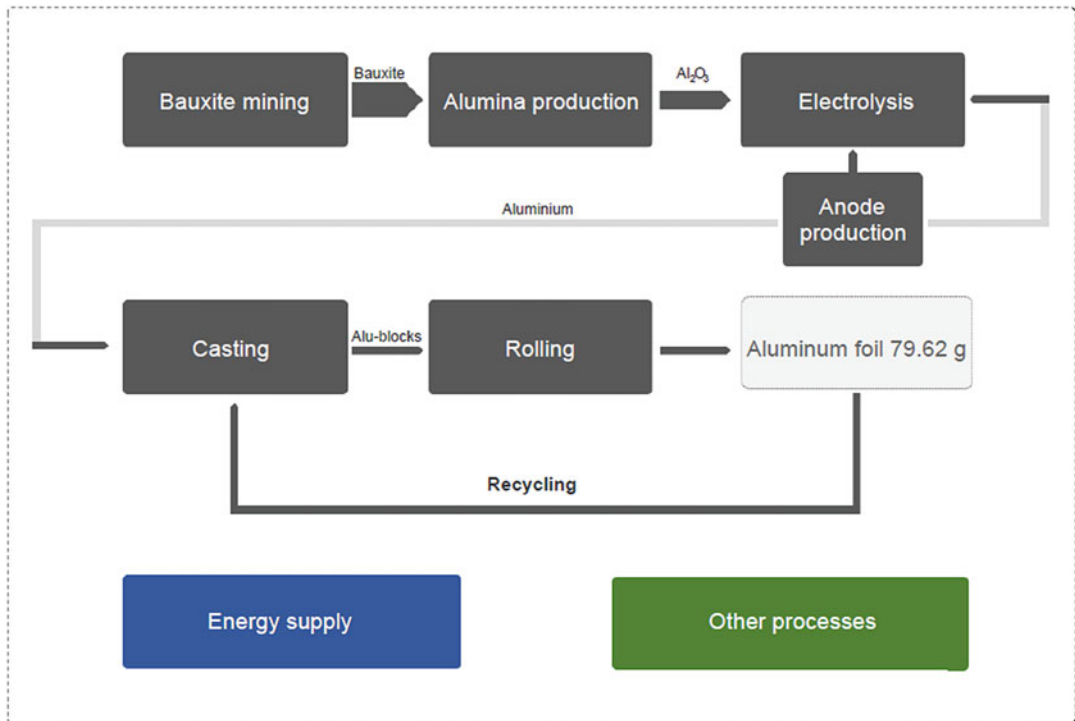
- Maintenance
- Employees
- Distribution
- Use

The considered functional unit was an aluminum foil roll. The dimensions are: length 10 m, width 29.5 cm, and the thickness are 10  $\mu\text{m}$ . With a density of 2.6989  $\text{g}/\text{cm}^3$ , it gives 79.6 g of aluminum. Any alloy constituents are neglected (Fig. 5).

**Life Cycle Inventory Analysis (LCIA)**

**Bauxite Mining**

Bauxite ore is the main raw material for aluminum production. It is mined in the open pit mine after the removal of overburden. This material is stored on the side and then used again for backfilling. Depending on the hardness of the rock, the explosive can be used to loosen the bauxite. Then it is milled and washed to extricate impurities. After drying, it can be shipped or brought to the alumina factory.



**Possibilities and Limits of Life Cycle Assessment in Sustainability Reviews, Fig. 5** Qualitative material flow for aluminum foil (Dobler 2017)

For the material flow model is assumed the import of bauxite from Jamaica (53%), from Guinea (26%), and Brazil (20.2%). The following table shows the inputs and outputs of this process step (It is only a partly staging of the inputs and outputs. The complete tables are shown in the appendix). Water is mostly spent on washing and fuel is used for mining and transporting the bauxite. On the output side accumulate overburden, waste water, and dust.

#### Aluminum Production

Alumina production takes place in North America and involves grinding and decomposition with NaOH, the precipitation process, and the calcination of the alumina. In addition, the maintenance of the equipment and the treatment of exhaust air, waste water, and waste are considered.

The main input is again bauxite. Apart from that, sodium hydroxide and lime are necessary. In addition to some air emissions such as SO<sub>2</sub> and mercury, this process also causes large quantities of red mud.

#### Anodes Production

The anode produced in this process stage is used in the fused-salt electrolysis as fuel because they are consumed during the process. The main component is carbon, which is fixed to a steel suspension. Petroleum coke is calcined during production, then ground and mixed with coal tar pitch. From this mixture are formed and cooled blocks.

#### Electrolysis

This processing unit begins with the processing of aluminum and ends with the separation of molten aluminum. The balance includes alumina processing, auxiliary materials production, monitoring, maintenance and treatment of exhaust air, waste water, and waste.

#### Casting

The molten aluminum from the electrolysis is processed and poured in this process step. In the beginning, it is transferred to holding furnaces, where it is adjusted with alloying elements depending on the request. It is fluxed with various gases to remove impurities in aluminum. For example, nitrogen or chlorine is blown into it in order to resuspend

particles and to reduce the gas content in the melt. Subsequently, the aluminum is poured into different forms. For the further rolling process, it is casted in the form of 20 t heavy blocks.

This processing unit includes pretreatment of metal, internal recycling of process scrap, metal treatment, casting, packaging, maintenance and treatment of exhaust air, waste water, and waste.

#### Rolling

In this process unit (is cast aluminum rolled in the form of 20 t heavy blocks), the blocks are then rolled until they are converted to a 10 µm thick foil. (The final product is a 10 µm thick foil.) In the beginning, the surface of the block is milled in order to smooth it. Then it is heated to approximately 500 °C and hot-rolled until it reaches a thickness of 2–5 mm. Subsequently, the cold rolling process begins until the desired thickness is reached. This processing unit includes pretreatment of metal, internal recycling of process scrap, the rolling process, packaging, transportation, maintenance and treatment of exhaust air, waste water, and waste.

#### Recycling

Due to a lack of data, the use and collection, as well as preparation for the production of secondary aluminum, are not considered. Only the production of recycled aluminum is considered again. As a database serves a process described in the ProBas database ProBas (2004). It is assumed that the collected waste will be melted again, together with process scrap and capital scrap. Since ProBas does not provide process procedures and specific material flows, only information about energy and resource consumption can be generally made. It should also be mentioned that another electricity mix is used for recycling.

#### Energy Supply

Electricity is a huge stream of energy, especially for the electrolysis process. In order to minimize environmental impact, it is recommended to choose renewable energies as a basis. Generation of electricity always results in large losses in conversion and distribution, making emissions even more immense compared to other forms of energy. Two scenarios are considered in order to



demonstrate what influence has the choice of energy sources. The baseline scenario comes from a typical US electricity mix. This is composed as follows:

- Coal 50.67%
- Atom 20.40%
- Gas 18.71%
- Water 5.61%
- Waste 1.87%
- Heavy fuel oil 1.56%
- Wind 0.70%
- Geothermal power 0.40%

An alternative scenario is used by a Norwegian electricity mix. Norway supplies itself almost exclusively with hydropower, which has a positive effect on resource conservation and emissions. This is composed as follows:

- Water 93.40%
- Gas 5.50%
- Waste 1.10%

It is assumed that the same electricity mix is used for the entire production process. All material and energy flows are considered, including the upstream chain (Fig. 6).

### Life Cycle Impact Assessment (LCIA)

#### Cumulative Energy Demand (CED)

The cumulative energy demand is a measure of the total expenditure of energy resources, the primary energy necessary for the provision of a product or also energy source. In this case, are considered all upstream chains, i.e., all energy quantities spent, for example, for the production of auxiliary materials or for the provision of energy.

Figure 7 shows the CED for both scenarios. All process units are colored differently and listed individually according to their type of energy.

It is easy to see that the production with the US power mix shows a significantly higher consumption. The electrolysis constitutes a large part of the entire CED. The difference is present especially in this process step since only electricity is used as energy. Particularly, the CED is significantly higher in relation to the final energy actually used if this is generated with the help of fossil fuels. This is mostly due to the supply and

the conversion losses during production. Hydropower, which is almost solely used in the Norwegian electricity mix, does not require the provision of energy sources.

#### Global Warming Potential (GWP)

The CO<sub>2</sub> equivalents represent the aggregation of all greenhouse gases according to their greenhouse gas potential (Fig. 8). For example, CO<sub>2</sub> has a factor of one as the base value, while NO<sub>2</sub> is significantly more harmful to the climate and the equivalent factor 265 is applied.

#### Acidification

Acidifying gases enhance the acidification of terrestrial and aquatic systems. The acidification potential is determined by conversion to SO<sub>2</sub> equivalents. These emissions are aggregated and evident for each process step in the below Fig. 9. A big difference is again observable between the two scenarios. The reduction of almost 70% comes with the application of Norwegian electricity mix.

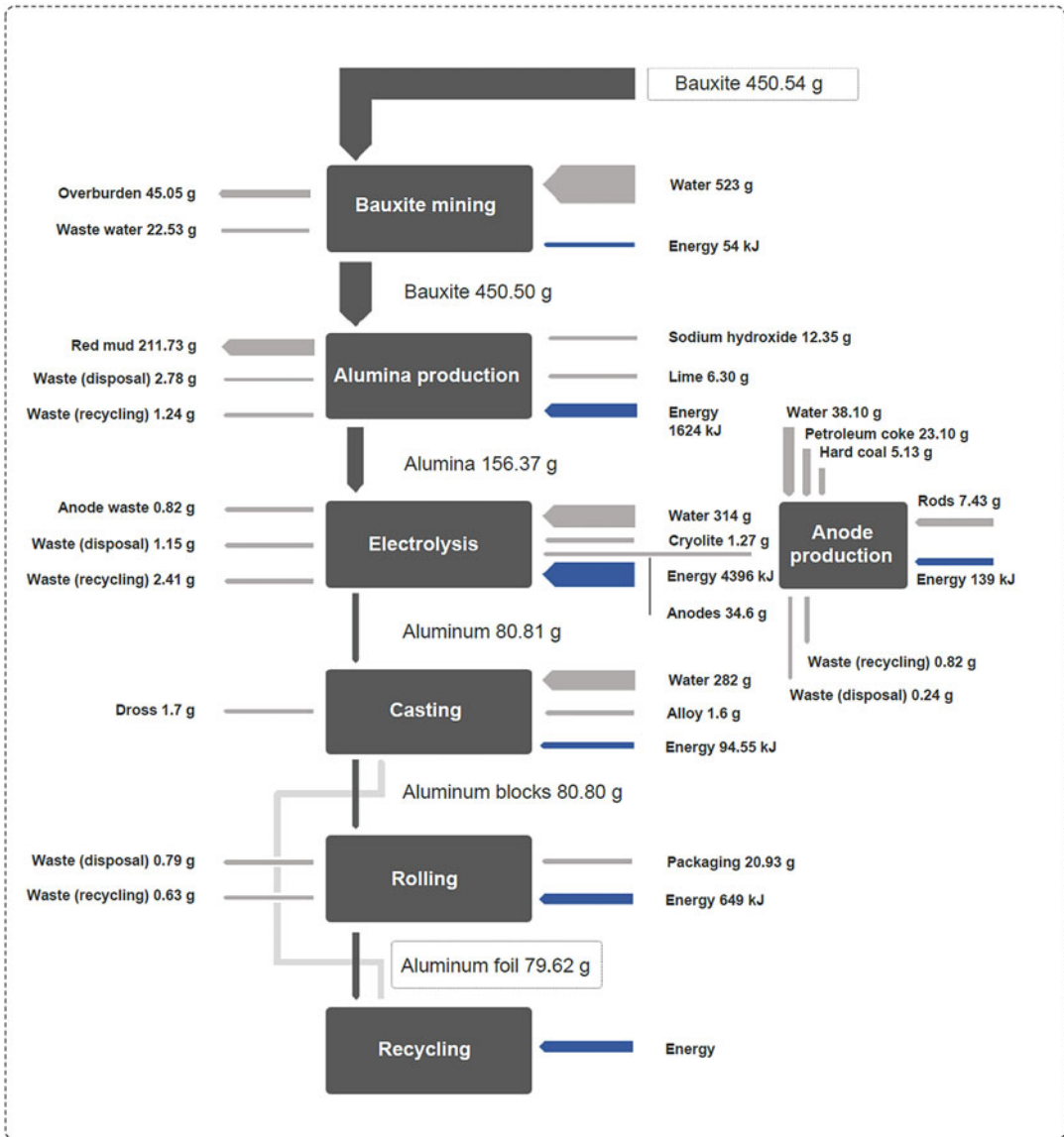
#### Tropospheric Ozone Precursor Potential (TOPP)

Summer smog or photo-smog is the result of an increase in ozone generation under the influence of light near the ground. Some substances from the volatile organic carbon compounds group are responsible for the creation of low-lying ozone in the presence of sunlight or other starter substances (e.g., NO<sub>x</sub>). Tropospheric ozone precursor potential equivalents are the quantitative expression of the ozone generation potential and are expressed by various air pollutants (ProBas 2017). The greater the amount of tropospheric ozone precursor equivalents, the greater is the risk of summer smog (Fig. 10).

The difference is probably the biggest in this comparison. When using Norwegian electricity, the ozone creation potential is seven times lower than the other scenario.

#### Interpretation

It has been clearly shown that the production of aluminum is an energy-intensive process and therefore the choice of energy supply has a huge influence on the environmental impacts. In particular, if

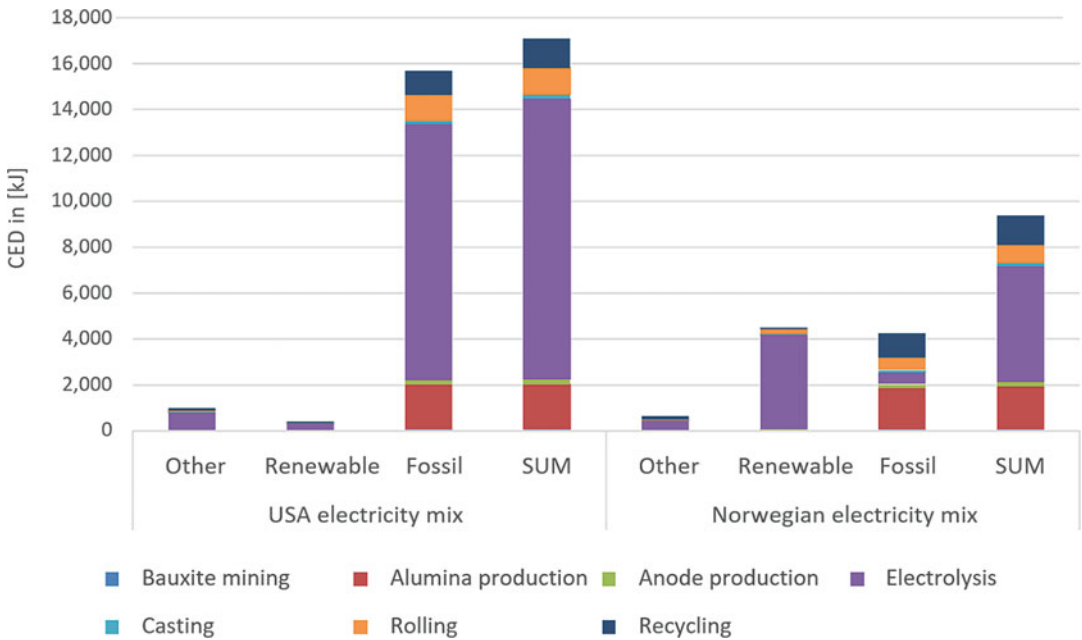


**Possibilities and Limits of Life Cycle Assessment in Sustainability Reviews, Fig. 6** LCI as a material flowchart for aluminum foil (Dobler 2017)

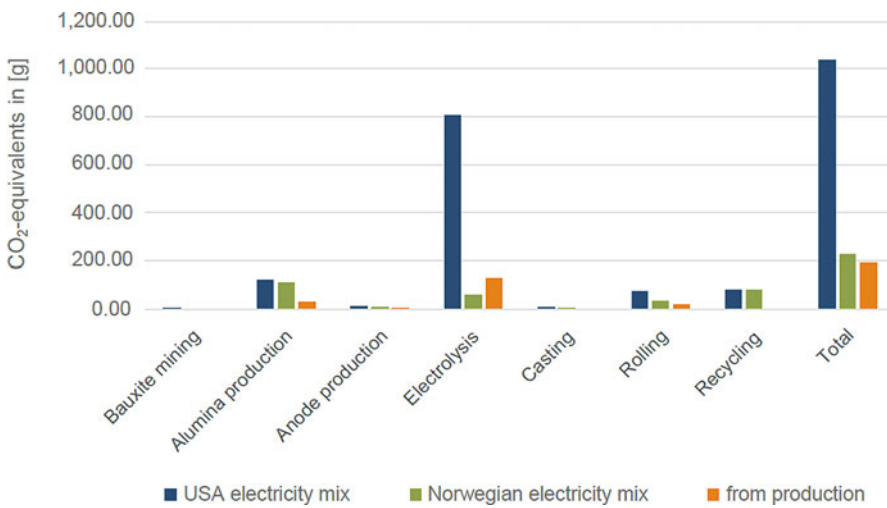
one remembers that with the use of fossil fuels, the cost of the supply is very high and thus the consumption increases even further. Therefore, it is important not to consider the final energy, but the CED. To this are added the environmentally harmful emissions during combustion. It would be advisable to perform the process of fused-salt electrolysis in a country such as Norway because even if the consumption and emissions for transport are

included, they do not exceed the consumption during production in America.

Another point that was not considered in the Ecobalance is the problem of red mud, which occurs in alumina production in a large amount. To date, this is stored in large basins and is not utilized. Especially in less developed countries, red mud is simply led into rivers. That has devastating consequences for ecosystems, because it consists of



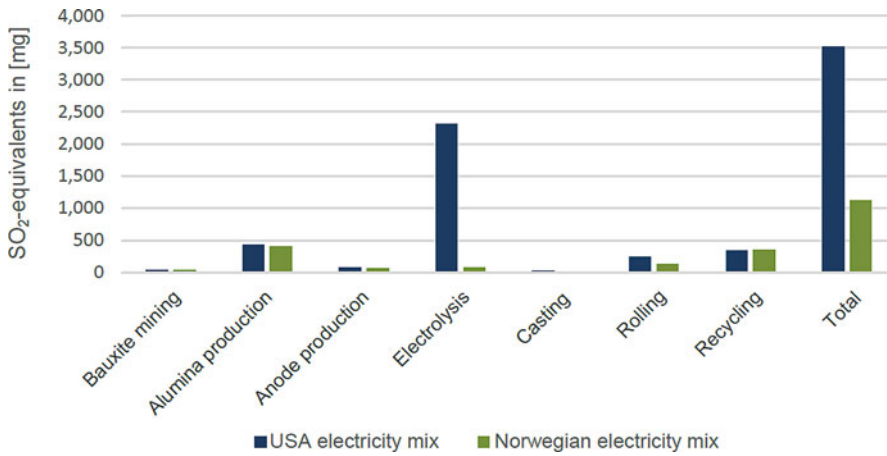
**Possibilities and Limits of Life Cycle Assessment in Sustainability Reviews, Fig. 7** Cumulative energy demand for aluminum foil (Dobler 2017)



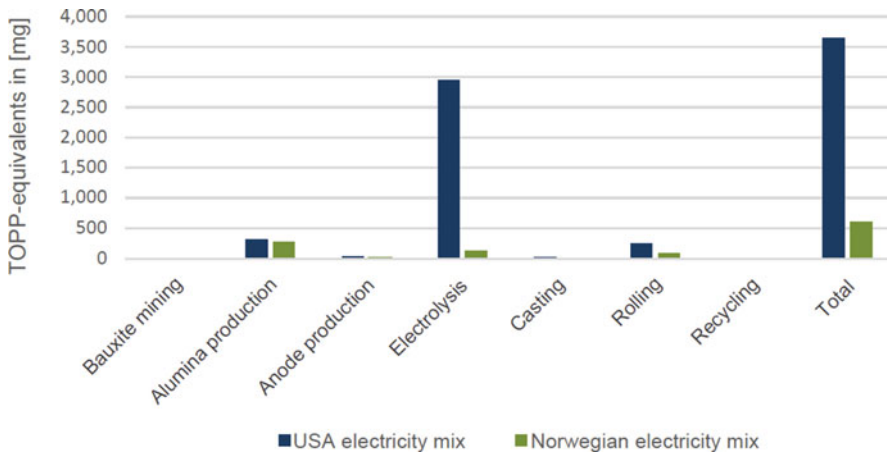
**Possibilities and Limits of Life Cycle Assessment in Sustainability Reviews, Fig. 8** Global warming potential for aluminum foil (Dobler 2017)

corrosive caustic soda and heavy metals. Additionally, shifting of the pH value heavy metals can be washed out and get into the groundwater. Therefore, complete utilization would be appropriate. In terms of urban mining, this sludge could be used as a source of resources as it contains not only aluminum

and iron but also another set of metals. There is still further potential for improvement in the sense of the circular economy. A large part of the aluminum ends up in waste incineration. Although it is possible to extract aluminum from the slags, the energy requirement for this is relatively high.



**Possibilities and Limits of Life Cycle Assessment in Sustainability Reviews, Fig. 9** Acidification potential for aluminum foil (Dobler 2017)



**Possibilities and Limits of Life Cycle Assessment in Sustainability Reviews, Fig. 10** Tropospheric ozone precursor potential for aluminum foil (Dobler 2017)

Basically, it can be said that aluminum is a versatile metal and is indispensable in our modern society. It has very good features and is available to us to a large extent. Nevertheless, efforts should be made to further increase the recycling rate to avoid the energy-intensive process of primary aluminum production. Also, the health aspects through the use of aluminum should not be neglected. With regard to aluminum foil, particles can be detached by acid or other processes and enter the organism. For this reason, the use of sandwich paper or similar alternatives would be recommended.

The LCA of aluminum production was used to illustrate the methodology and to highlight how improvement potentials are concluded from the assessment of the value chain of a product.

### Possibilities and Limits of Life Cycle Assessment in Sustainability Reviews

Nowadays, Life cycle assessments are increasingly used today as decision-making support for the assessment of economic processes and in the manufacture of products. In addition to the

consumption of resources, above all the energy flows, longevity and also selected effects on the ecosystem (soil, water, air, biodiversity, ecotoxicity, waste) are to be shown. In this regard, the overall goal of life cycle assessments is to get more clarity on the individual production steps in order to be able to better assess the influence on the true costs, including environmental costs. Also, production constraints due to different production constraints and often different social working conditions need to be identified. In order to limit the complexity of life cycle assessments, priority should be given to scarce resources as a priority in the assessment (Bringezu and Schütz 2001a, b).

Instead of taxes on emissions from the air, soil, water, noise, etc., life cycle assessments seek to identify, in addition to an assessment, measures to prevent environmental pollution and measures to increase the efficiency of manufacturing products. The increase in the world population and the resulting increase in resource use (20% of the world's population in industrialized countries currently consume almost 80% of resources) are also compelling ongoing improvements in resource efficiency (Bringezu and Bleischwitz 2009). But measures to prevent waste, more nonwaste technologies and improvements in recycling processes are important. Only when resource efficiency increases and the “ecological backpacks” of processes, products, buildings, and services decrease by a factor of 5–10, the economy will be sustainable (Bringezu and Bleischwitz 2009). In this regard, LCA results can be used for process optimization for sustainable production as required in the Sustainable Development Goal (SDG) 12 that is “Sustainable Production and Consumption” (United Nations 2015). Even the LCA methodology does not consider social aspects, it is a valuable tool to contribute to the assessment of the sustainability of value chains of products. It is important to be noted, that LCA does not replace EIA, even it can contribute to an EIA.

In recent years, some efforts have been made to develop various methods and tools to assess the current situation in society and support sustainable development decision-making. One method suitable for this purpose is the Life Cycle Sustainability Assessment, which applies the life-cycle

approach to all dimensions of sustainability (environmental, economic, and social) for more reliable and robust outcomes. For this purpose, the method of Life Cycle Sustainability Assessment (LCSA) was developed (Zamagni et al. 2013; Guinée 2016). Here the life-cycle approach is applied to all dimensions of sustainability (environmental, economic, and social) in order to achieve more reliable and robust results. This methodology includes LCA, where the environmental impacts are assessed, Life Cycle Costing (LCC), where economic and environmental factors are taken into account, and Social Life Cycle Assessment (SLCA), to analyze the social consequences (Zamagni et al. 2013; Guinée 2016).

$$LCSA = LCA + LCC + SLCA$$

The LCSA, as well as the LCA or LCC, is often used to compare two or more products and shows the product that has less impact. The process was applied to the construction sector and the renewable energy sector to identify opportunities and limitations (Caruso et al. 2017). As such, LCSA forms an approach for the operationalization of sustainability.

## Conclusions and Outlook

The term “sustainability” adopted by the UNEP in Rio de Janeiro (1992) is much needed in the political debate on global development and the environment. Instead, an attempt is made to quantify the sustainability of products (goods and services).

Life cycle assessments play an increasingly important role in the political debate about the ecological profiles of products and production processes. They offer the opportunity to analyze environmental impacts and the factors that determine them throughout their life cycle, thus providing the basis for decisions. This happens in companies, but also in politics and the public. Further, life cycle assessments provide opportunities for sustainability-oriented innovation management in product development.

Despite the fact that the topic has been up-to-date for 40 years, sustainable products are gaining widespread acceptance on the market only slowly. The reasons for this are companies' reservations

of the incompatibility between profitability and ecological goals, trade-offs in this regard, and the fear of lower profits. Lack of security, lack of know-how and doubts about the operationalizability concern companies as well. Having in view this situation, sustainability-oriented innovation management in product development must gain a larger awareness at the producers as well as the consumers. This situation needs to the need to provide more space to sustainable product development including LCA in teaching programs in higher education.

According to Schneider and Lüderitz (2018), LCA as an environmental assessment tool should have a permanent place in education programs on sustainability. Moreover, LCA could be applied in the sustainability assessment of university performances. According to Lo-Iacono-Ferreira et al. 2017, organizational life cycle assessment is a feasible assessment tool for higher education institutions with environmental management systems.

## Cross-References

- ▶ [Carbon Footprint and Sustainable Development](#)
- ▶ [Cradle-to-Grave and Sustainable Development](#)
- ▶ [Energy Management Tools for Sustainability](#)
- ▶ [Environmental Impact Assessment as a Tool for Sustainable Development](#)
- ▶ [Environmental Impacts and Sustainable Development](#)
- ▶ [Environmental Resources and Sustainable Development](#)
- ▶ [Greenhouse Gases and Sustainable Development](#)
- ▶ [Importance of Sustainability Indicators](#)
- ▶ [Sustainability and Life Cycle Cost Analysis](#)
- ▶ [Sustainability Indicators](#)

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## Principles for Responsible Management Education (PRME) Initiative

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## The Principles for Responsible Management Education (PRME): Definition

The Principles for Responsible Management Education (PRME) is the United Nations' initiative launched as a platform to integrate sustainability in business- and management-related higher education institutions globally and to equip students with the mind-set, skills, and knowledge to become responsible leaders. The launch of the PRME initiative took place at the 2007 UN Global Compact Leaders' Summit in Geneva by UN Secretary-General Ban Ki-Moon. PRME was launched as a global call "to change the purpose of business education in order to adapt the teaching of business educators to a growing trend of corporate citizenship, corporate social responsibility and sustainability" (Alcaraz and Thiruvattal 2010).

PRME has become the largest organized partnership between the United Nations and management-related higher education institutions, counting over 730 signatory institutions in 92 countries worldwide, including 45 of the *Financial Times'* Top 100 Business Schools (Dimple et al. 2017). Since 2007, an estimated of 23 million students have graduated from PRME signatory institutions. Although the field of responsible management education is very

dynamic and crowded, scholars agree that PRME is currently a very dominant actor, holding important symbolic capital and positioned to be a cornerstone supporting, connecting, and promoting other actors in the space (Storey et al. 2017). While the direct impact of PRME is hard to quantify, it is evident that this initiative has become an important catalyzer for debate and action around responsible management education and sustainability across the world. In that sense, many academics consider PRME as an opportunity to be “a powerful driver of corporate sustainability considering the ‘long-term effect’ of education” (UN Global Compact 2015).

## History and Key Initiatives

The Principles for Responsible Management Education were created in 2007 by a global task force integrated by 60 deans, university presidents, and representatives of leading business schools and higher education institutions. The development of a principle-based global initiative for higher education institutions responded to a recommendation made by academic participants of the UN Global Compact, an idea that was officially introduced and discussed at the Global Forum “Business as an Agent of World Benefit” at Case Western Reserve University in the fall of 2006 (PRME 2019b). The global task force was mandated to develop a set of Six Principles as a framework for a global engagement platform to advance responsible management education.

The following organizations co-convened the drafting process and endorsed the final document (alphabetical order):

- AACSB International
- Aspen Institute Business and Society Program
- European Academy of Business in Society (EABIS – now ABIS)
- European Foundation for Management Development (EFMD)

- Globally Responsible Leadership Initiative (GRLI)
- Net Impact

## The Six Principles

The Six Principles constitute a framework that guides higher education institutions, including business and management schools, in their journey to integrate responsible management education and sustainability in teaching and researching, as well as into their own organizational practices (PRME 2019i). Academics around the world have expressed their strong belief that by using the Six Principles, higher education institutions can integrate universal values into curriculum, research, organizational practices, dialogue, and partnerships to be better suit their students to contribute to building a sustainable and inclusive world (Alcaraz and Thiruvattal 2010; Blasco 2012; Stroufe et al. 2014).

The Six Principles’ Preamble states that “As institutions of higher education involved in the development of current and future managers we declare our willingness to progress in the implementation, within our institution, of the following Principles, starting with those that are more relevant to our capacities and mission. We will report on progress to all our stakeholders and exchange effective practices related to these principles with other academic institutions” (PRME 2019i).

While the Principles remain mostly unchanged since they were introduced in 2007, an update to “Principle 2 – Values” was endorsed at the opportunity of the 2017 PRME Global Forum – 10 Years of PRME. This update includes “organisational practices” to Principle 2 reflecting signatories’ commitment to incorporate the values of the global social responsibility in their own “organisational practices” along with curricula and academic activities. The 2017 Global Forum Outcomes Declaration made clear that this change aims to “emphasise the importance of our own organisations’ practices as role models and to ensure that our own practices are consistent with what we teach and research” (PRME 2019m).

**Principle 1 – Purpose:** We will develop the capabilities of students to be future generators of sustainable value for business and society at large and to work for an inclusive and sustainable global economy.

**Principle 2 – Values:** We will incorporate into our academic activities, curricula and organisational practices, the values of global social responsibility as portrayed in international initiatives such as the United Nations Global Compact.

**Principle 3 – Method:** We will create educational frameworks, materials, processes and environments that enable effective learning experiences for responsible leadership.

**Principle 4 – Research:** We will engage in conceptual and empirical research that advances our understanding about the role, dynamics, and impact of corporations in the creation of sustainable social, environmental and economic value.

**Principle 5 – Partnership:** We will interact with managers of business corporations to extend our knowledge of their challenges in meeting social and environmental responsibilities and to explore jointly effective approaches to meeting these challenges.

**Principle 6 – Dialogue:** We will facilitate and support dialog and debate among educators, students, business, government, consumers, media, civil society organisations and other interested groups and stakeholders on critical issues related to global social responsibility and sustainability.

We understand that our own organisational practices should serve as example of the values and attitudes we convey to our students.

### PRME's UN Mandate and Partnerships

The PRME initiative was launched by former UN Secretary-General Ban Ki-Moon in 2007 at the UN Global Compact Leaders' Summit. At that opportunity, Ban Ki-Moon stated his clear vision

that “the Principles for Responsible Management Education have the capacity to take the case for universal values and business into classrooms on every continent” (PRME 2019b). Since then, the PRME initiative continues to serve this important UN mandate. In 2017, at the 10th anniversary of the initiative, his excellency António Guterres, United Nations Secretary-General, further ratified this mandate to advance UN goals and priorities recognizing that “the PRME initiative was launched to nurture responsible leaders of the future. Never has this task been more important. Bold leadership and innovative thinking are needed to achieve the Sustainable Development Goals” (Guterres 2017).

Partnership with other UN entities is very crucial to deliver meaningful impact globally. For that reason, PRME is a founding UN member of the Higher Education Sustainability Initiative (HESI) created in the run-up to the United Nations Conference on Sustainability Development (Rio+20) in 2012. HESI is a partnership between United Nations Department of Economic and Social Affairs (UN DESA), UNESCO, United Nations Environment, PRME, United Nations University (UNU), UN-HABITAT, UNCTAD, and UNITAR (HESI 2019). Through this multilateral UN partnership, PRME contributes to the larger higher education institution space fortifying HESI's ability to provide “a unique interface between higher education, science, research and policy making” (HESI 2019).

PRME also collaborates closely with other UN Global Compact's sister initiatives such as the Principles for Responsible Investment (PRI) and the Sustainable Cities Program (PRME 2019; Sustainable Cities Programme 2019).

### PRME Signatories and the Sharing Information on Progress (SIP)

Academic institutions that wish to join PRME must be publicly recognized (i.e. legal/government recognition) and must have degree awarding authority. PRME signatories commit to implement the Six Principles and report to stakeholders on the progress made against the Principles every 24 months (PRME 2019) together with (since

officially came into effect in January 2016) reporting on the Sustainable Development Goals (SDGs).

The most important commitment of academic institutions participating in the PRME initiative is to regularly share information with its stakeholders on the progress made in implementing the Six Principles, through a report called “Sharing Information on Progress” (SIP). Given its nature of integrity measure, the SIP’s main goal is “to serve as a public vehicle for information on responsible management education” (PRME 2019). The Principles and the SDGs now form the joint framing for PRME, in that the SDGs are the agenda (in line with Agenda 2030) for content of initiatives (the “why” and “what” for areas of action) and the Principles are the “how” (for implementing strategies, plans, and practices). Thus all signatories are now expected to use the joint framings in their work and report on both in their SIP reports.

In addition, the SIP can promote stakeholder dialogue, peer learning among signatories, as well as significant awareness and reflection on the mission, strategy, and activities of the reporting signatory. In that sense, SIP reports can provide important benefits, both to individual signatories and to the responsible management education movement. Reporting signatories have stated that they see important value in preparing, producing, and sharing SIP reports since they help them to create awareness of the mission of PRME and their institution commitment, give a concise and comprehensive overall picture of your organizations’ activities, boost visibility and reputation, define direction and strategy, track and benchmark progress, etc. (Weybrecht et al. 2015). Signatories that fail to comply with the SIP policy requirements are listed as “non-communicating.” Non-communicating signatories are not eligible to take leadership roles within the PRME community. In order to maintain the integrity of the PRME initiative, signatories that are “non-communicating” for more than 1 year are delisted from the initiative and their names are publicly listed on the PRME website, newsletter, and annual report (PRME 2019).

### SIP Policy

The SIP policy was developed in 2008 based on the consensus reached at the First PRME Global Forum for Responsible Management Education and was further updated in 2015 based on an extensive consultation with the PRME Working Group on SIP and PRME Advisory Committee. The reviewed policy has been endorsed by the 2015 Global Forum for Responsible Management Education – Sixth Annual Assembly in the Outcomes Declaration (PRME 2015).

### Mandatory Requirements

In order to maintain a “communicating” status, a signatory must fulfill the following requirements:

- (a) Signatories are required to communicate their progress at least every 24 months.
- (b) SIPs must include each of the following elements:
  - A letter signed by the highest executive of the organization expressing continued commitment to PRME.
  - A description of practical actions (i.e., relevant policies, procedures, activities) that the institution has taken to implement one or more Principles during the past 24 months (since signing up to PRME or since last submission of SIP).
  - An assessment of outcomes (i.e., the degree to which previously outlined goals were met or other qualitative or quantitative evaluation of results).
  - Key-specific objectives for the next 24-month period with regard to the implementation of the Principle(s). Concrete strategies and timelines are encouraged.
- (c) SIPs are to be submitted online via [www.unprme.org](http://www.unprme.org).
- (d) Signatories must complete a brief self-assessment that summarizes the content of the SIP.

### PRME Networks

As a global learning community, signatories are encouraged to engage with a variety of platforms and activities to scale up their commitment to transforming business and management education. By taking part in PRME's networks, signatories and partners can expand their engagement with peers and be part of a larger movement for sustainability and responsible management education. In that sense, PRME functions as a "network of networks" that produces a multiplier effect through dialogue and partnerships (Principles 5, 6 and SDG 17).

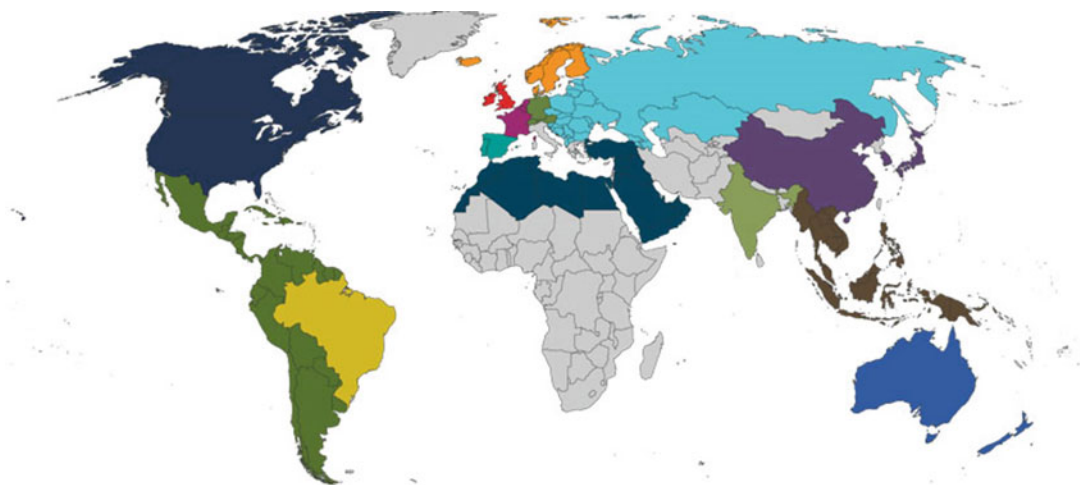
### Chapters

Since the 2012 PRME Global Forum that took place at the United Nations Conference on Sustainable Development – or Rio+20 – in Rio de Janeiro, where PRME Chapters were proposed and discussed by the constituency, 15 Chapters emerged around the world. Chapters are working globally to help advance the Six Principles within particular geographic contexts, rooting PRME into different national, regional, cultural, and linguistic landscapes (PRME 2019c) (Fig. 1). With different levels of maturity, all Chapters are driving local collaboration and partnership, connecting with relevant local stakeholders – including the Global Compact Networks – and

contributing to have a better aligned local-global strategy and implementation of PRME and the SDGs. Chapters develop their own governance arrangements within the PRME Chapter policies and locally adapted programs, including:

- Providing a platform for dialogue, peer learning, and action
- Increasing the visibility of PRME and its signatories in the region
- Adapting the Six Principles into a local context
- Developing and promoting activities linked to the Six Principles and the SDGs

Key examples of the contributions of the Chapters include working with students' initiatives such as WikiRate, Aim2Flourish, the Sustainability Literacy Test (Sulitest), etc. (WikiRate, Aim2Flourish, Sulitest 2019) and embedding the SDGs into the curriculum (Chapter Australia and New Zealand and UK and Ireland), running "SDG Roadshows" and multi-stakeholder roundtable events with Global Compact Local Networks (Chapter UK and Ireland and DACH), and producing several resources such as the SDGs' Good Practices Handbook to disseminate the SDGs in educational institutions (Chapter Brazil) (PRME 2017) and the Guide for Implementation of the



**Principles for Responsible Management Education (PRME) Initiative, Fig. 1** Distribution of PRME Chapters around the world (PRME 2019)



System of Indicators of University Social Responsibility (Chapter LAC) (Yepes et al. 2018). Additionally, Chapters are important drivers of the growth of the initiative in qualitative terms (e.g., recruiting and retaining signatories) as well qualitatively (e.g., deepening the engagement and implementation of PRME in the local contexts).

### PRME Signature Events

1. The Global Forum is the PRME premier's global event that brings together over 350 pioneers and thought leaders of responsible management education including deans, university presidents, professors, researchers, business school accreditation bodies, and students, in addition to high-level guests from the United Nations, the private sector, civil society, and media. This event takes place every couple of years aiming to celebrate and take stock of achievements and impact by individual signatories, networks, and the overall initiative, to raise awareness about the SDGs through good practices, as well as to lay the groundwork for the future of the responsible management education movement.
2. PRME Regional Meetings play a significant role in advocating for the Principles as well as to achieving progress on the SDGs in regional context. They provide a local platform for collaboration and partnership among academia, civil society, and business representatives (PRME 2019). Every year around 12–15 regional meetings take place around the world focusing on local priorities and themes under the PRME and SDG umbrella.
3. The Responsible Management Education (RME) Research Conference was conceived within the PRME Chapter DACH, who organized the inaugural RME Research Conference in the fall of 2014, as “a forum for on-going research on the manifold initiatives undertaken to implement PRME in business teaching for the future we want” (PRME DACH 2014). These series of events aim at fostering exchange among PRME Chapters and Working Groups as well “as to cater to a

wide audience ranging from academics to practitioners eager to advance their knowledge and skills integrating responsible management and sustainable development into their professional efforts” (PRME 2014) (Fig. 2). Since its creation this event takes place every year in different regions driven by several Chapters in close collaboration with the Working Groups and Chapter DACH. Host institutions of past editions are HTW Chur (Switzerland), The American University in Cairo (Egypt), IMC University of Applied Sciences Krems (Austria), ISAE-FGV (Brazil), and Cologne Business School (Germany). The upcoming 2019 RME Research Conference will be hosted at Jönköping International Business School (Sweden).

### PRME Working Groups

PRME Working Groups deepen collaboration within and across signatories and partners on specific issues relevant to sustainability and responsible management and related to the SDGs. Furthermore, PRME Working Groups foster collaboration among faculty, industry experts, business leaders, and students with the aim to develop and publish relevant resources as well as cutting-edge research (PRME 2019d). Currently, eight working groups are actively advancing issues such as anti-corruption, gender equality, anti-poverty, climate change and environment, business for peace, etc. Examples of these fruitful collaborations include publications such as the *Socially Responsive Organizations* and *The Challenge of Poverty and the Responsible Management Education and the Challenge of Poverty: A Teaching Perspective* (Gudić et al. 2014, 2015), both books published by the PRME Working Group on Poverty in cooperation with Greenleaf Publishing. Another publication worth mentioning is the book *Beyond the Bottom Line: Integrating UN Global Compact into Management Education* (Gudić et al. 2017), a joint effort of the PRME Working Group on Poverty along with the Anti-Corruption and Gender Equality Working Groups.





**Principles for Responsible Management Education (PRME) Initiative, Fig. 2** Photo: Fifth RME Research Conference hosted by Cologne Business School at the Flora in 2018

### Active PRME Working Groups

- Working Group on Innovation Challenge
- Working Group on Anti-corruption in Curriculum Change
- Working Group on Business for Peace
- Working Group on Climate Change and Environment
- Working Group on Gender Equality
- Working Group on Humanistic Management
- Working Group on Poverty, a Challenge for Management Education
- Working Group on Sustainability Mindset

### PRME Champions

The mission of the PRME Champions group is to “contribute to thought and action leadership on

responsible management education in the context of the United Nations sustainable development agenda” (PRME 2019c). Building to their mission, PRME Champions commit to working collaboratively to raise the bar on business and management education in curricula, research, educational frameworks, sustainability-based partnerships, and thought leadership. Champions serve the broader community through active engagement with the existing networks (e.g., Chapters, Working Groups, etc.) to support wider and deeper implementation of the Principles and contribute to the broader UN goals, including the SDGs. As part of the second cycle of PRME Champions, this leadership group undertook advanced tasks and game-changing projects to address systemic challenges faced by the PRME community and responsible management space. These efforts include offering resources such as the Transformational Model (PRME 2019j) which focuses on the challenges and opportunities of embracing the institutional transformation journey.

### Making the Sustainable Development Goals Core to the Mission

In 2015, all 193 Member States of the United Nations adopted the Sustainable Development Goals (SDGs), making a commitment over the next 15 years to create a world we all want, also referred as the 2030 Agenda for Sustainable Development (“2030 Agenda”) (UN 2015) (Fig. 3). While Goal 4 (or “SDG 4”) of the SDGs, dedicated to ensuring “inclusive and quality education for all and promote lifelong learning,” is the one that one could rapidly identify with PRME, in reality, this initiative touches virtually on all SDGs, since education itself is one of the most critical vehicles (along with funding and partnerships) to ensure progress in achieving all 17 SDGs.

During the 2016 PRME Strategic Review, which conducted a wide consultation with key stakeholders (including the PRME Steering and Advisory Committee, Chairs and other key partners and experts), PRME’s Vision and Mission were reformulated to incorporate the SDGs and to ensure that all PRME’s workstreams explicitly aligned to advance the Global Goals.

**PRME’s Vision:** Realising the Sustainable Development Goals through responsible management education

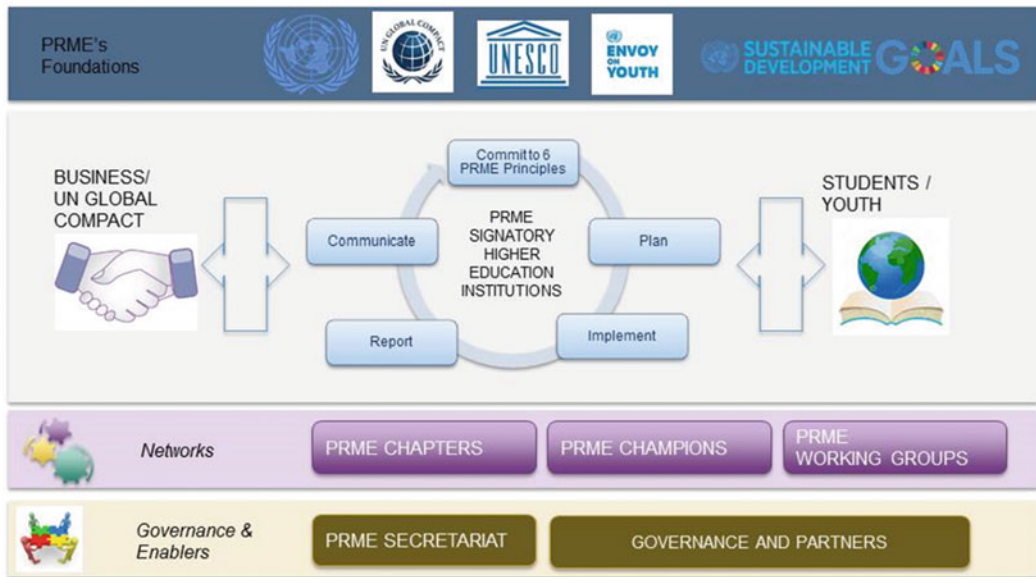
**PRME’s Mission:** Transforming business and management education, research and thought leadership to develop the responsible leaders for the world we want

Several recommendations, goals, and key performance indicators stemmed from the 2016 Strategic Review. In addition, a few strategic areas “must win battles” were identified: clarifying the brand (e.g., vision and mission), optimizing the global organization, revising the governance, as well as creating balanced growth and sustainable funding. Progress on these areas was considered essential to make PRME fit for purpose. Furthermore, during the strategic review, stakeholders highlighted the importance to strengthen the connection with several UN entities, business, and students to drive forward the demand for responsible management education and enable systemic change. As a result of the strategic review input,



**Principles for Responsible Management Education (PRME) Initiative, Fig. 3** The UN Sustainable Development Goals (UN 2019)

# PRME Engagement Model



**Principles for Responsible Management Education (PRME) Initiative, Fig. 4** PRME Engagement Model. PRME 2019

the PRME Secretariat puts together the following “PRME Engagement Model” to further explain the complex system of partnerships within the initiative (PRME 2019a) (Fig. 4).

## PRME’s Unique Position to Contribute to the SDGs

While PRME is a relative young organization, this initiative has acquired substantial social capital over the years, which places it in a very unique position as a key multi-stakeholder convener for collaboration and partnerships around the SDGs globally. In that sense:

- **PRME is the largest organized relationship between the UN and management-related higher education institutions:** With currently more than 730 signatories in over 90 countries and a reach to more than 2.5 Million students (PRME 2017), PRME inspires and champions responsible management education, research, and thought leadership globally and provides

bridges for effective partnerships with the business sector – in particular through the business members of the Global Compact Local Networks and UN Global Compact’s business participants – to support of the SDGs.

- **PRME brings together a framework for sustainability and responsible management education:** PRME’s framework includes the Six Principles for continued progress on sustainability and responsible management education in support of the ten Global Compact Principles. PRME participants, involved in the development of the current and future leaders for the world we want, commit to advance the Principles as well as report good practices and progress related to the Principles to all their stakeholders. The Principles become even more relevant in the context of the SDGs, since they provide a roadmap to embed sustainability and responsible management education in the values, curricula, research, methods, dialogue, and partnerships. The breath and

interconnectedness of the SDGs have shown the importance of this shifting paradigm in education. More than ever the SDGs compel us to gather expertise from across disciplines and sectors to gain a more holistic view of the complex global issues and potential opportunities and solutions. Issues like poverty, climate change, human rights, and equality can only be tackled with a diverse and integrated knowledge approach. By having an interdisciplinary focus, along with experiential learning approach, we can enable a better understanding of the complex issues of our time to address sustainable development.

- **PRME is a “network of networks” for collaboration and partnership:** PRME has evolved into a “network of networks” that includes 15 regional Chapters around the world that in partnership with the Global Compact Local Networks are collaborating to advance the SDGs locally. Additionally, Champions’ leadership group of 31 committed institutions work globally to raise the bar on responsible management education and sustainability; and 8 Issue Working Groups produce research and teaching materials on the SDGs. PRME also created in 2016 a student engagement platform in collaboration with partners like WikiRate, Aim2Flourish, and Sulitest. PRME has also focused attention to understand students’ views and preferences on sustainability and responsible management education, as well as to further engage with them and raise their voices. The fourth annual report on the international business student study led by the Principles of Responsible Management Education (PRME) Secretariat and PRME Signatory Macquarie Graduate School of Management (MGSM) (Haski-Leventhal and Manfield 2018) is an ongoing effort to bring students’ perspectives into the responsible management education discussions and actions. In addition, PRME seeks strong partnerships with other important actors in the space including accreditation associations, ranking agencies, publishers, NGOs, etc.
- **PRME is the academic counterpart of the Global Compact Local Networks:** Across the

world PRME Chapter and Global Compact Local Networks recognize the value of working together. The PRME-Global Compact Local Networks’ partnership creates a triple value proposition by “bringing forth sustainable development challenges and the global-local practitioner agenda to enrich academic thinking, research and teaching of PRME institutions,” “strengthening the capacities of Local Networks to build their SDG Action Plans on a sound and robust analytical basis supported by academic analysis and diagnosis,” and “providing a practitioner agenda for applied research, teaching and innovation on how sustainable business can have a significant impact in advancing the SDGs in the local-global context” (Cortes and Librizzi 2016).

- **PRME is a content creator and disseminator:** The PRME initiative thematic works focus on research and teaching in support of the SDGs. In that sense, eight PRME Working Groups focus on issues such as climate change, gender equality, and advancing human rights in business, and addressing issues like poverty and corruption through responsible management education. Furthermore, PRME signatories produced multiples of examples of how they are incorporating the SDGs into their research and curricula.

## 12 Years After Its Creation: What’s Next for PRME?

At the 2017 Global Forum for Responsible Management Education – 10 Years of PRME “Bringing the SDGs to Every Classroom and Every Organisation” – the PRME community celebrated a decade of work while reflecting on the concerns on the fundamental global challenges and opportunities going forward (PRME 2019m).

PRME has embarked in a long journey to engage critical global mass in a world where by estimates there are over 16,000 business and management programs (AACSB 2015). As a global multi-stakeholder learning community of thought leaders, academics, businesses, students, and leadership experts, PRME invites signatories and



partners to engage with a variety of platforms to scale up their commitments and efforts toward transforming business and management education in support of the SDGs.

Based on the discussions of previous Global Fora as well as the input received from different stakeholders, an important focus for PRME in the next years will be to continue strengthening the multi-stakeholder convener nature of PRME to further support the implementation of the Six Principles and the SDGs everywhere. In that sense, the Outcomes Declaration of the 2017 Global Forum, Section 3 titled “Our Results and Commitments” (PRME 2019m), spelled out the many great efforts that have taken place on this realm for the last decade and the need to further enhance the quality of the initiative through leadership at many levels (e.g., individual, institutional, and collective level). Furthermore, Section 4 of the same document, titled “partnerships and coalitions to accelerate change,” outlined the importance of partnering with governments, businesses, nongovernmental organizations, accreditation institutions, ranking agencies, student initiatives, media, and other drivers in order to tackle fundamental issues of sustainability and create tipping points for systemic change.

At this point in time, when PRME is about to turn into 12 years of existence, it is relevant to highlight and sharpen its unique value proposition – serving as the largest higher education and responsible management education arm of the United Nations – including to:

1. Further emphasize the PRME initiative’s principles-based approach to sustainability and responsible management education (e.g., thought leadership and policy developing functions).
2. Strengthen collaboration and partnerships between higher education institutions, businesses, governments, and the United Nations to achieve real transformation and action (SDG 17).
3. Bring PRME to a next level of innovation and transformation by leveraging technology to enable more effective peer learning and sharing within the constituency and beyond.

In that sense, and as pointed out in my PRME 2030 Vision paper, it seems necessary to tackle a few strategic areas to develop the PRME initiative into the primary convener and catalyzer to transform responsible management education globally:

### **Incubating Systemic Change Through Collaboration and Partnerships**

It seems priority to further strengthen relationships among higher education institutions and business, youth, publishers, ranking and accreditation associations, media, and other levers with the purpose of creating the conditions for systemic change that will allow sustainability and management education to become the rule instead of the exception. A recent example of this aim is a new report *Business School Rankings for the twenty-first Century* (Pitt-Watson and Quigley 2019) on business school rankings, which was successfully launched in Davos last January during PRME-Corporate Knights Luncheon. The report, published under the aegis of the UN Global Compact and with the support of Aviva Investors, “provides an overview of the current state of the business school rankings and suggests possible changes to help align business school education with the needs of the 21st century” (PRME 2019). This report draws on consultations with business schools, progressive businesses, rankings publications, accreditation agencies, and relevant civil society organizations convened by several organizations including PRME (PRME 2019). This project has already resulted in positive conversations with some rankings agencies on the necessary actions to improve evaluation and ranking and encourage “a race to the top” in business education.

### **Raising the Bar: Driving Innovation and Thought Leadership**

An important component of PRME’s work is to foster thought leadership, policy development, and content creation. It is important to strengthen this focus by increasing generation of high-quality, innovative, and interactive materials through the PRME Secretariat, Working Groups, and Champions that can be disseminated and mainstreamed through PRME participants, Chapters, Global Compact Local Networks, and partners. In addition, it becomes necessary to

create further interlinkages between academia and business on critical themes (e.g., anti-corruption, human rights, anti-poverty, gender issues, climate change, etc.). An example of this aim is the Responsible Management Education Research Conference conceived at the PRME Chapter DACH in 2014 and hosted since then by many Chapters around the world. This highly interactive annual event brings together several PRME Working Groups, Chapters, and other practitioners and experts encouraging working together in breaking silos and creating innovative solutions to raise the ceiling of responsible management education. Outcomes of these events include relevant publications such as the PRME Journal Special Issues. The 10th Anniversary PRME Special Issue of the *International Journal of Management Education* was launched at the 10th Anniversary Global Forum and featured 26 articles with a retrospective of PRME over its first decade and a look forward to the era of the SDGs.

### Scaling Up: Mainstreaming Responsible Management Education Globally

PRME as a global platform of responsible management education has the opportunity to leverage its convening power within and beyond the PRME community, including the strategic partnerships with HESI, UN Envoy for Youth and other UN entities, business and youth to lead mainstreaming sustainability, and responsible management education across the world. In order to provide a robust dedicated platform for discussion and action, it will be crucial to strengthen the engagement frameworks and building capacity to help nourish the multi-stakeholder essence of PRME. Additionally, it will be needed to provide the appropriate technology to facilitating effective exchange among the PRME community, partners, and students. An example of this aim includes the development of an easy-to-use “community of practice” sharing and learning tool to engage, share, and disseminate good practices and relevant materials throughout the constituency and beyond.

### Organizational Priorities

As part of the 2016 PRME Strategic Review, three “must win battles” were identified, (1) clarifying the

brand, (2) optimizing the global organization, and (3) creating balanced growth (including sustainable funding and governance revision). These priorities are due to a revision which will ensure that the PRME Secretariat lives up to the higher standards of responsibility and sustainability that promotes globally. By conducting a strategic revision of the progress achieved since 2016 and further engaging key stakeholders in an inclusive and transparent fashion, the organization will be better suited to deliver meaningful impact and unleash its unlimited potential.

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## Problem-Based Learning

- ▶ [Reflective Practice for Sustainable Development](#)
- ▶ [Service-Learning and Sustainability Education](#)
- ▶ [Work-Integrated Learning for Sustainability Education](#)

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## Procurement Policy for Sustainable Development

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### Definition

Procurement policies reference actions by a multinational corporation through supply chains. Often reporting of corporate sustainability is limited to the assessment of sustainability within a corporation's own operations and excludes supply chain actions. However, pricing pressures, regulatory variations, and externalizing of costs are the very basis for outsourcing corporate activities. In

employing a supply chain, a company can limit responsibility for sustainability and profit through the supply chains actions. For this reason, procurement policies that include sustainability parameters can promote and enable sustainability in vulnerable and poor communities, which are often those most exploited by supply chain operations, particularly in developing countries.

## Introduction

The effects of anthropogenic activities on the environment are increasingly evident and can be observed in environmental degradation stemming from pollution to natural resource exploitation. There is also increasing evidence of social justice issues associated with these activities. However, interestingly, consumer preference has gravitated toward goods that are deemed to have been manufactured “sustainably.” As a result, firms, to the extent they are sensitive to consumer approval, are putting more thought into where their materials are coming from and how they are produced. To align the interests of consumers with the actions of firms, an assessment of the alignment of each to environmental and social justice by own-action, where own-action references activities within one’s control, is arguably of value. With respect to the firm, this type of assessment requires examining not only firm specific actions but also indirectly attributable actions by way of the supply chain. However, given that supply chain relationships may or may not be included as part of a firm’s self-defined responsibility, the actions of supply chain activities are often overlooked merely as a result of underreporting. For this reason, the supply chain offers an opportunity for contribution through engaged oversight to the overall sustainability assessment and status of a firm.

The sustainability goals a company adopts are typically found in a sustainability report, which is largely a marketing tool for tracking and communicating progress. However, as consumers and investors have increased interest in sustainability, firms have integrated sustainability parameters across operations, increasingly being made to focus on indirect operations, such as supply

chains, where they may have in the past turned a blind-eye, in alignment with traditional profit-making schemes.

Sustainability is not only economic, environmental, and social performances, which are known as the triple bottom line (TBL) at the corporate level, but also in the operational levels where production, procurement, and employment are conducted. Policies involving the supply chain or “procurement policies” aim at acquiring adequate services, goods, and materials for production. Sustainable policies focus on acquisition that is economically viable without causing harm to the environment or any groups of people.

The innumerable factors that affect the TBL and metrics that exist to measure the influence on development and growth create a complex modeling landscape (Matos and Hall 2007), which makes creating sustainable procurement policy difficult. Some firms avoid it altogether, and others do so with mixed or poor results due to the nature of a dynamic operating system, bounded rationality, and resulting unforeseen and unintended consequences. In economics, these are known as externalities and they occur when causal connections are not accounted for in the development of the policy. By definition, the costs of externalities are not reflected in the market price of the product but are instead borne by those directly affected. This indicates that market mechanisms such as supply and demand will not sort these issues out and it will require some form of regulation or activism by a stakeholder to change the policy. It is important that these risks be managed in the drafting of the policy, which requires an understanding of sustainable development. The evolution of sustainable development, its drivers, and barriers to overcome are critical when trying to understand how supply chain decisions will affect the TBL.

## Sustainable Development

Sharachchandra Lélé (1991) addresses the origins of sustainable development in his paper titled “Sustainable Development: A Critical Review.” He asserts that sustainable development became a serious topic of discussion in the 1980s (Lélé 1991),

when the International Union for the Conservation of Nature and Natural Resources (IUCN) presented the World Conservation Strategy (WCS). As the first prominent iteration of the sustainable development movement, it was considered to be somewhat narrow in scope, which prompted criticism. As the name of the organization implies, the primary focus of the strategy was development that took the conservation of living resources into account. The strategy did not include demand in its scope; instead it was considered an independent variable whose structure and level operated autonomously (Lélé 1991). As such, this supply-sided strategy was built upon by the United Nations Environmental Program (UNEP).

UNEP incorporates more than natural living resources in its definition of sustainable development, including social justice issues and economic concepts. These include:

- Assisting those in extreme poverty as those with no other options will likely participate in activities that are detrimental to the environment.
- The concept of developing with an aspect of self-reliance and constraining consumption of natural resources.
- Utilizing non-neoclassical economic criteria to pursue cost-effective development.
- Human rights concepts like promotion of public health, developing and distributing appropriate technologies, minimizing food insecurity by promoting self-reliance, access to clean drinking water, and providing adequate shelter.
- The largest departure from the previous iteration is the shift in focus to promote initiatives that have people as the direct beneficiary with the understanding that this once people's needs are met they are then able to make more meaningful progress on environmental issues. (Lélé 1991)

The IUCN, UNEP, and World Wildlife Fund sponsored a conference on Conservation and Development in 1986, which further assessed sustainable development but broadened the discussion to emphasize that all sectors and levels of industry and government can promote sustainable development. The five main topics of discussion included:

- Ceasing to view development and conservation as separate entities and integrating conservation into development.

- Ensuring that basic human needs are met.
- Striving for and attaining equity and social justice.
- Allowing for social self-determination and cultural diversity.
- Monitoring and continually improving the integrity of the ecosystem. (Lélé 1991)

Perhaps the most well-known and frequently cited definition of sustainable development comes from the World Commission on Environment and Development (WCED). In their 1987 report "Our Common Future" (commonly referred to as the Brundtland report), they greatly expanded the breadth of the definition of sustainability. They did this by changing the temporal structure of the conversation surrounding development and assessing the key drivers that promote it. The definition that they presented is broad yet concise and is the most widely used definition of sustainability:

Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs (WCED 1987, p. 41)

Using this definition, the commission set forth goals to move toward sustainable development that mirrored and expanded on the aforementioned contributions:

- Reviving growth
- Changing the quality of growth
- Meeting essential needs for jobs, food, energy water, and sanitation
- Ensuring a sustainable level of population
- Conserving and enhancing the resource base
- Reorienting technology and managing risk
- Merging environment and economics in decision-making (WCED 1987, p. 46)

It is important to note that this is the first time that risk management was incorporated into the goals toward sustainable development. The commission did not solely focus on industry and trade groups as the implementors of sustainable development strategies but asserted that education of and action stemming from "citizens" groups, non-government organizations (NGOs), educational institutions, and the scientific community is critical. They also believed that while developed nations would likely lead the way, developing nations remained an integral component. This is

because the trend in development has been economic growth through resource exploitation, loose regulation, suppression of human rights, and other social justice issues until such a point that the country is sufficiently developed to begin to rectify the resultant issues. This process is slow and to the detriment of developing nations. The commission recommended that development be cognizant of the limitations associated with current technologies and the societal structures. The commission argued that the inclusion of limitations must be represented in the consumption of environmental resources by accounting for the ability of the ecosystem to absorb the anthropogenic effects without compromising environmental integrity. In conjunction with environmental resource exploitation, the commission surfaced the significance of poverty eradication as an element of sustainability; the sensitivities related to poverty are maintained in the Sustainable Development Goals, which center on poverty alleviation, seemingly significant on a global scale and particularly in developing countries.

The commission asserted that so long as extreme poverty is pervasive, sustainable development will not be possible. Poverty is correlated with a rationale for excessive breeding, due to high infant mortality rates and necessity of additional hands to aid in the basic functions of a household. Insufficient resources at a national level result in governments being unable to ensure that basic human rights are met. This, in turn, exacerbates poverty and leads to further exploitation, particularly from wealthier nations looking to outsource production to reduce costs related to regulatory policies focused on the treatment of labor and overall environmental resources, including the commons: air, water, and soil. Corporations can shift production to areas of the world where regulations are more lax and therefore costs of production are lower, given the opportunity to externalize costs. In net, this shifts the negative effects of production on developing or economically vulnerable countries. This continues to make wealthy countries wealthier and poor countries poorer as the integrity of the latter's ecosystem is eroded. As these environmental stresses push ecosystems to their limits, the

disparities between the wealthy and poor nations increase. The wealthy nations are better equipped to deal with effects of climate change and the poor nations are unable to effectively remediate their polluted land, water, and air. So long as these trends continue, sustainable development will not be realized globally to its full potential and thus, international economic relations must be a primary concern of policies aimed at sustainability.

The Brundtland Report was among the most significant works in sustainable development and was an essential building block in subsequent iterations of the definition. The United Nations (UN) has been involved in the evolution and has put forth more specific goals. The UN Department of Economic and Social Affairs and with their leadership and the participation of countries around the world they have developed a list of 17 Sustainable Development Goals:

- End poverty
- End hunger
- Promote good health and well-being
- Provide access to quality education
- Gender equality
- Clean water and sanitation
- Affordable and clean energy
- Decent work and economic growth
- Industry, Innovation and Infrastructure
- Reduce international inequalities
- Sustainable cities and communities
- Responsible consumption and production
- Climate action
- Protect aquatic ecosystems
- Protect terrestrial ecosystems
- Peace, justice and strong institutions
- Develop global partnerships to achieve the goals  
 (“About the Sustainable Development Goals – United Nations Sustainable Development”  
[2019](#))

When making decisions about procurement policy, it is important to consider the implications of activities throughout the supply chain. To work toward these sustainable development goals, managing the risks of detrimental behaviors is critical. A decision that has not been carefully thought out can reduce environmental, social, or economic performance and due to the complexity of these ecosystems, often more than one. The Brundtland Report focused heavily on the eradication of

poverty and as such, factors that directly feed into this goal are assumed to be among the most significant. These are education, decent work, women's rights, public health, and access to clean drinking water, sufficient food and child labor regulation. Other important considerations are corporate social responsibility and corporate social performance, equitable international trade agreements, investor activism, and risk assessment/management. Significant issues that typically effect the environment directly include energy efficiency, reduction of greenhouse gas emissions, conservation of natural resources, pollution prevention, land use consideration, and the reduction of biodiversity loss.

## Poverty

Labor rates, high unemployment, and loose regulations make developing countries attractive for upstream supply activities such as raw material extraction, processing, and manufacturing. Policies that specify how these activities are conducted and alternatively, set minimum conditions for workers can be influential in how the TBL performance of a company. It can have a tremendous effect on poverty in the region where business is being conducted.

Poverty is a primary issue due to its current endemic state and its propensity to feed into other problems. Impoverished nations tend to have lower levels of literacy, higher rates of infant mortality, less access to clean drinking water and sufficient food. While these factors result in a lower quality of life, they also can lead to a less productive workforce, further perpetuating the poverty cycle. These developing nations can struggle with drafting environmentally beneficial or even benign policies when the global economy is thriving. In less prosperous times, less care is taken when considering environmental impacts of decisions. (WECD 1987) If the basic needs of the people are being met, they will likely practice more discretion in their manufacturing practices, pollution regulations, and resource utilization.

The WECD saw stimulating third world growth from within as a solution to the poverty

problem. With a reworking of international economic relations, the commission believed that as economies grew, shifts toward environmentally sound policies would follow. One way to achieve this is to get industrial countries to alter their systems of production, by getting rid of surpluses and removing inequitable trade restrictions on countries that had a competitive advantage. Protectionist policy, as noted by the commission, may be beneficial for some in the short run but often leads to more severe issues. Trade barriers are difficult to overcome later, given that inequities resulting from trade restrictions become institutionalized, requiring even more action to promote trade equity.

Lélé (1991) and the WECD (1987) may have agreed that international economic relations were largely played out through trade, multinational corporations, commercial lending, and aid; however, Lélé (1991) felt their arguments were flawed. He noted that there was not an equitable basis for monetary exchange and policies tended to favor more prosperous countries. Neoclassical economics, which guides the majority of economic decision-making, has presented a flawed model, assuming that growth will eliminate poverty without assessing the distribution of the wealth created.

Another important aspect of poverty is the conditions surrounding work. Decent work is a term that encapsulates an array of elements that improve quality of life and are socially beneficial. Venkatesan and Luongo (2019) note the International Labor Organization (ILO) definition of decent work with consideration of the following criteria:

- Employment opportunities
- Adequate earnings and productive work
- Decent working hours
- Combining work, family and personal life
- Work that should be abolished
- Stability and security of work
- Equal opportunity and employment
- Safe work environment
- Social security
- Social dialogue, employers,' and workers' representations (Venkatesan and Luongo 2019)

They also indicate that child labor needs to be regulated. While it should not be prohibited, as that could impose undue stress on families that



require the extra income, it should be constrained. Further, they note that working hours need not interfere with the ability to receive an education. Finally, they advocate that working conditions must also be representative of the worker demographic and children must be allowed to work only where it is safe for them to do so. Another key component of worker demographic that Venkatesan and Luongo (2019) address is that women have opportunities in the workforce.

There is an observably high correlation to women's rights and GDP per capita, which has been shown to shift allocations of public expenditures to increase funding of healthcare, education, and children (Doepke et al. 2012). It is worth noting that this shift in spending promotes growth in sectors that are more service based than production based, these tend to be associated with lower environmental impacts and more social benefits. Less prosperous countries tend to have less rights accorded to women (Doepke et al. 2012), but Doepke and Tertilt (2009) theorized that as technologies advance in developing countries, women's rights will improve to meet the increased demand for labor (Doepke et al. 2012).

While women's rights may improve as suggested by this theory, it is unclear whether decent work will result, or whether economic gender gaps would be narrowed. Presumably, this increase in technology is the result of an increase in trade with industrial nations. While an increase in trade such as this surely will provide new jobs, this type of trade typically promotes export-oriented production that is characterized as both low-wage and low-skill. As women's prior positions have not allowed them to gain requisite work skills; they will likely fill these positions, which can lead to increasing gender-based wage differentials (Venkatesan and Luongo 2019). This then indicates that perhaps increasing women's abilities to vote, access to education, and reproductive rights rather than simply stimulating growth to provide abundant unskilled labor opportunities would be more impactful. One avenue to promote this is through the inclusion of contract clauses in supplier contracts, where the clauses explicitly promote women's integration into skilled positions through apprenticeship

programs and onsite childcare, for instance. These types of initiatives are one way that corporations can increase their social performance and become good corporate citizens. International trade and corporations that source materials from or have manufacturing facilities in developing countries have a large impact on the pervasiveness of poverty in developing countries.

### Corporate Citizenship

All corporations have an associated supply chain, which includes all activities involved in the flow and transformation of goods from raw material extraction and each subsequent process all the way through to the acquisition by the end-user. The flow of information is another aspect of the supply chain (Seuring and Müller 2008). The management of the supply chain can greatly influence the effects on poverty and environmental damage associated with a corporation's activities. Corporate citizenship is a term used to address the level business ethics utilized in operations and it manifests in two primary ways: corporate social responsibility (CSR) and corporate social performance (CSP). Carroll (1999) states, "The CSR firm should strive to make a profit, obey the law, be ethical and be a good corporate citizen" (p. 22). Donna Wood (1991) expanded on the concept and defined CSP as "a business organization's configuration of principles of social responsibility, process of social responsiveness, and policies, programs, and observable outcomes as they relate to the firm's societal relationships" (Wartick and Cochran 1985; Wood 1991). Both CSR and CSP can be defined within the direct corporate activities or be expanded to include a corporation's responsibility with respect to its supply chain behavior. Unfortunately, without regulatory definitions, or alternatively in their absence, consumer and or investor pressure to adopt corporate policies holistically across all operations, including contract relationships, as typically defines supply chains, CSR and CSP, is determined by the corporation. This latter outcome to the extent it does not align with corporate profit maximization may offer no benefit to promoting equity within the supply chain.



Sustainability reports are generated by corporations directly and are typically available on their website. Arguably, sustainability reports have no common standard and are not required to go through an assurance process (Junior et al. 2013). Furthermore, even if an assurance process is adopted, there, again, are no standards as to how this validation is conducted or even the type of entity that conducts it. Consumers and investors could be influential in pressuring corporations have a standardized process; this would increase transparency and provide a vehicle to align investor and consumer behavior with environmental and social justice.

Investor activism and/or shareholder activism are key ways that failures relating to environmental, social, and governance (ESG) performance are addressed by stakeholders outside the company. However, the overall effectiveness of it is unclear as David et al. (2007) indicates and it may actually incentivize managers to spend more on combating negatively perceived claims and in maintaining discretion of business activities. Mitchell et al. (1997) assert that stakeholder salience theory addresses the level of corporate action as being highly correlated to the prominence of the stakeholder promoting it. David et al. (2007) infers that corporate responses may, however, be more symbolic than substantive. They offer some suggestions as to why these symbolic resolutions are accepted; one being that the proposal was to advance a separate agenda that necessitated only the appearance of victory. Additionally, they suggest that awareness of the issue and the potential spillover effects, which the study did not measure, could be the true goal of the proposal.

Sustainability related proposals by shareholders have been on the rise and in 2013 they made up 40% of proposals according to Grewal et al. (2016). Grewal et al. (2016) indicate that when a proposal is filed regarding an immaterial ESG issue, a corporation initiates a resolution that improves performance, relative to the issue, quicker and more substantially compared to proposals filed on material ESG issues. However, a corporation's valuation declines in response to immaterial proposals and valuation increases in response to proposals related to material issues, as

would be expected. They suggest that possible reasons for the response to immaterial issues stems from "agency problems, low awareness of the materiality of sustainability issues, and as an attempt to divert attention from poor performance on material sustainability issues" (Grewal et al. 2016, p. 36). They stress that for shareholder activism to be successful, the distinction between material and immateriality of sustainability issues is crucial.

## Environmental Impact

Supply chain decisions regarding biomass-based products may be made to make a product more sustainable. However, if this decision is not well thought out, it may be more detrimental than beneficial. Land use and land use change can often be overlooked; however, they can reduce the overall effectiveness of a well-intentioned decision. For instance, an increased demand for corn to produce ethanol may entice farmers to switch the crops they grow to meet this new demand for corn. Assuming that the demand for the crop they originally grew did not change, the reduction in supply is likely to either increase the price or incentivize clearing land to grow barley. The latter is indirect land-use change, which can compound environmental effects because it necessitates heavy machinery, soil remediation, and the clear cutting of forests. Less trees mean less CO<sub>2</sub> being sequestered increasing global warming potential. It also results in significant habitat loss for wildlife, which is primarily responsible for biodiversity loss.

### An Example: Emissions

There are two kinds of emissions that can contribute to pollution: direct and indirect. Direct emissions would be anything that is a result of a process taking place on-site and indirect emissions are primarily from electricity usage. Thus, both energy efficiency measures and decisions about pollution control are important in mitigating overall emissions. Green House Gas (GHG) emissions or commonly called carbon emissions have been an area of focus since there is increasing

evidence that anthropogenic activities are contributing to climate change. Carbon footprinting is a way for companies to evaluate their carbon emissions and identify areas for improvement. The GHG protocol provides standards for corporations, cities, policies and actions, products, and projects. It identifies three scopes: direct emissions inside a given boundary; indirect emissions from: electricity generation, steam, heat, and cooling; and other emissions, which accounts for all other upstream emissions that are required for activities taking place within the boundary (“A Corporate Accounting and Reporting Standard” 2019). While pollution dominates the conversation, there are other environmental impacts that need to be considered in supply chain decisions.

The utilization of nonrenewable resources may be affected by procurement policy. The cost of fossil fuel-derived energy can be less expensive, due to the externalizing of costs and existing infrastructure. However, the world is a closed system that operates under known physical principles including the laws of thermodynamics. These laws essentially state that energy in a closed system cannot be created or destroyed, but entropy slowly diminishes the available energy in a system (Meadows 1982). Given that all human activity operates within a closed system, more energy consumed means less total energy available. It is important to note that energy here refers to all matter. This implies that a truly sustainable supply chain would utilize no non-renewable resources. This may lead to a shift toward production from biomass-based materials, which as noted can have other ecosystem impacts.

Pollution, resource utilization, and land use can disrupt the balance of natural ecosystems. As they are complex and interconnected, it is not always clear how these disruptions will play out. There are primary actors and passive actors, which are content in their roles until some disruption occurs that changes the fundamental structure of the ecosystem (Perrings 1995). This disruption could be anthropogenic, or it could be a natural disaster. A healthy ecosystem can correct itself and a different species may simply have to fill in a different role, but an ecosystem whose integrity is compromised due to biodiversity loss may have

a harder time filling in the gaps. Perrings (1995) stresses the importance of maintaining biodiversity because it is in essence the life support for the ecosystem.

## Supply Chain and Procurement Policy

Research is often relied upon to guide policy decisions, but much of the focus of research has been on the environmental performance; social and integrated TBL aspects are considered far less (Seuring and Müller 2008; Meehan and Bryde 2011). The goals of sustainable development and the factors that influence them should be incorporated in the development of procurement policies. Effective supply chain management based off of adopted policies is also necessary to work toward sustainable development.

Often policies are only adopted addressing a specific aspect of sustainability. With an understanding of supply chain-related externalities, corporations can better address their performance on key ESG issues using a holistic framework. The impact of procurement policy on social justice issues such as poverty and equality can be significant.

However, if the focus of production is simply for economic gains, as is prevalent today, then firms will seek out cost minimizing policies. These tend to include production in locations where labor is cheaper due to an abundant supply of unemployed, unskilled workers. As previously stated, these policies effect women the most because the low-skilled work provided by these export-oriented firms is often filled by women. The working conditions are often unsafe, and wages are not representative of the risks and often do not provide adequately for a family. Younger members of the family unit may, as a result, perpetuate the cycle by participating in the workforce to provide financial support in lieu of education.

Intervention in the supply chain through regulatory policy and/or investor/consumer activism to promote “supplier management for risks and performance” and “supply chain management for sustainable products,” (Seuring and Müller 2008)

can provide pressure on corporations to actively manage supply chain activities to be in compliance with the most rigorous threshold for sustainability. These strategies can promote pay equity and also be employed to minimize direct environmental damage.

Resource exploitation is another possibility as impoverished regions have little concern for conservation of resources if they cannot meet their basic needs. Firms can minimize their impacts by working with their suppliers to ensure environmental and social justice issues are not being propagated. Actions taken in this regard will be evident in high CSP ratings, but there is an important aspect of accountability that can be influenced by stakeholders. Procurement policies can be influenced by pressure from external stakeholders such as governing agencies, NGO's, investors, consumers, and shareholders. While these interventions may not result in substantive change depending on the issue being addressed (David et al. 2007; Grewal et al. 2016) they can result in reputational impacts.

Poor working conditions and/or environmental degradation have caused reputation loss for companies such as Nike, Addidas, and Disney (Seuring and Müller 2008), that have resulted in lower corporate valuation. As stakeholders continue to be increasingly active in addressing sustainability issues, there will likely be increased corporate proactivity in adopting policies consistent with sustainable development. Measuring progress remains a challenge, but some tools exist to aid in this process. For example, life cycle assessment (LCA) examines and quantifies all the impacts of a product's entire life cycle. While not the panacea that some believe it to be, LCA provides a framework for understanding the unit processes involved throughout the supply chain. This level of understanding can help "close the loop" of the production process, improve product design and foster stewardship (Matos and Hall 2007). The drawback pointed out in Matos and Hall's (2007) work is that LCA's are time consuming and expensive and sometimes, especially when dealing with newer technologies, there is a lot of uncertainty. They suggest parameters and interdependencies can

potentially be identified through collaboration from teams on all sides of production. If these uncertainties cannot be reduced to a manageable level, they recommend incorporating the precautionary principle in the decision-making process.

## Conclusion

Sustainable development is a complex and dynamic process that is characterized by economic, environmental, and social performance. These three indicators are the triple bottom line that businesses are now looking at when developing the policies surrounding their supply chain. Corporations to the extent that they are bounded by operating constraints such as profit maximization and or operationalized sustainability across their supply chain can have significant influences on poverty and equality in the developing countries that are often relied upon in some aspect of production. For example, the inclusion of an employment parameter that ensures a "fair living" wage or childcare as defined by decent work can assist in promoting the welfare of women and children directly and indirectly by explicitly noting the action. The inclusion of corporate operating parameters in enabling sustainability in and across operations and supply chains in this manner can serve to enable the theoretical outcome of neoclassical economics by overtly promoting equity as part of macroeconomic growth. From the larger perspective of the Brundtland report (1987), as the conditions of the most vulnerable within a population improve and the basic needs of the poor are more readily met, it is possible environmental pressures will alleviate as well. Poverty is a leading cause of environmental degradation because those in desperate circumstances will have little choice but to exploit the ecosystems they live in. A key component in influencing businesses to have a high ethical standard for the way they source and produce goods is awareness brought on by pressuring adoption and evaluation of environmentally and socially sustainable policies. Procurement policies therefore may be characterized as critical for the realization of sustainable economic development.

## Cross-References

- ▶ [Economic Equity and Sustainable Development](#)
- ▶ [Environmental Justice and Sustainable Development](#)
- ▶ [Externalities and Sustainability Processes](#)
- ▶ [Grassroots Activism and Sustainable Development](#)
- ▶ [Investor Activism Towards Sustainability](#)
- ▶ [Social Responsibility and Sustainability](#)

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## Professional Development and Sustainability

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## Definition

Professional development refers to education programs intended to help teachers (among others) to improve their professional knowledge, competence, skills, and effectiveness. ESD competence-based professional development can help teachers acquire ESD competences and support them to delivery ESD to the curriculum, as well as to develop and implement school ESD policy.

## Introduction

Education for Sustainable Development (ESD) addresses the global environmental and social challenges by providing knowledge, skills, values, and attitudes that empower learners to contribute to sustainable development. It is transformational and holistic and involves learning about different sustainable development (SD) concepts and issues through suitable and effective pedagogies and learning environments (UNESCO 2014). The importance of education's role in achieving SD has been extensively discussed (e.g., UNECE 2011, 2013), recognized by the UN and highlighted throughout the Millennium and the Sustainable Development Goals (UN 2015; UNESCO 2018).

Education is expected to act as a driver for change (Fullan 2006), and teachers are crucial components for integrating ESD as a transformational process in educational systems and need to be empowered. Recent discussions for the future of education and ESD stress the importance of supporting educators through quality training, capacity-building programs, and continuous professional development on inclusive education and the promotion of democratic citizenship and sustainable development (UNECE 2009; UNESCO/EC 2018). Opportunities to reflect on the various pedagogical approaches they employ and to acquire the competences needed for empowering learners for engaging in decision-making and transformational action (UNESCO 2018) are also supportive to the educators' role.

The dialogue on educational change and ESD effectiveness has brought into light the necessity for developing ESD competences through teacher education and professional development (UNECE 2011, 2013; Roorda 2012; Adombent and Hoffmann 2013; Rauch and Steiner 2013). Teacher professional development and education concerns all the activities that develop individual skills, knowledge, expertise, and any other teachers' characteristics, within the design and delivery of specific education programs (Avgitidou 2014; Athanasoulla-Reppa et al. 1999). Competence acquisition is deemed necessary as it shifts education from input to output orientation (Reickmann 2011) and can bridge the gap between knowledge and action (Reickmann 2018 in Leicht et al. 2018).

In teacher professional development and education, competences are about those attributes and factors that enable teachers to demonstrate appropriate behaviors and attitudes (Charlton 1993; Meyer 1996) and be effective in their professional practice. The reorientation of teacher professional development and education toward competences development can recast ESD as quality education (Kadji-Beltran et al. 2017) since it affects learning at the level of the learners in their learning environment and at the level of the system that creates and supports the learning experience (Pigozzi 2007, p. 30).

## ESD Competences as an Intrinsic Part of Teacher Professional Development and Education

Several projects and international initiatives have been working toward identifying the ESD competences that teacher education should address. The CSCT Comenius project (Curriculum, Sustainable development, Competences, Teacher training) run by Environment and School Initiatives (ENSI) in 2002 was an attempt to meet the call of UNECE to offer curriculum models to teacher training institutes that would promote ESD integration in their curricula. The CSCT project envisioned teachers as individuals who are in a dynamic relationship with their students, their colleagues, and the wider society in ways that enable genuine and effective learning. For all these levels of engagement, teachers need specific competences which were explained with the five domains: values and ethics, action, knowledge, systems thinking, and emotions. These domains were connected to three overall competences: teaching, reflecting and visioning, and networking (Sleurs 2008).

The United Nations Economic Commission for Europe (UNECE 2011) developed a framework of competences for ESD educators in order to guide their preparation for ESD delivery within formal and nonformal education systems. *Learning for the Future*, the UNECE competences framework, consists of 39 key competences organized under 3 broad headings related to key ESD characteristics (holistic approach, envisioning change, achieving



transformation) and clustered according to the 4 dimensions of learning identified by UNESCO (1996): (a) learning to know, (b) learning to do, (c) learning to live together, and (d) learning to be. This effort was supported by another initiative undertaken by UNECE (2013) focused on empowering educators to work practically with competences in ESD, by preparing tools and providing concrete examples and activities that could be used and make ESD competences understandable and usable in the educational context.

Although these frameworks and models were well received, take-up and implementation were limited perhaps due to the fact that they were somewhat abstract, contained large numbers of competences, and were defined in complex and theoretical language.

### The RSP Competences for ESD Model

A Rounder Sense of Purpose is developing educator competences in Education for Sustainable Development (RSP) which started in 2015 as a 3-year, Erasmus-funded project with the aim of developing an accredited framework of educator competences in Education for Sustainable Development (ESD). Led by the University of Gloucestershire, UK, the project involved partner institutions from Cyprus (Frederick University), Estonia (Tallinn University), Hungary (Hungarian Research Teachers' Association), Italy (Italian Association for Sustainability), and the Netherlands (Duurzame PABO).

The starting point for this work was the United Nations Economic Commission for Europe framework of educator competences for ESD (UNECE 2012), which itself draws upon earlier international work. The UNECE ESD framework is an important theoretical tool that set the foundation for elaborating and defining the ESD competences framework. The project's task was to revisit the UNECE ESD competences with a view to making them more accessible, easy to transfer, and measurable, acknowledging the economic imperatives facing teachers across the EU.

During 2016, RSP partners worked on "distilling" the UNECE competences, i.e., reducing the number by removing repetition while identifying gaps. This was done with reference to other

significant studies in the field including Roorda (2012) who developed the RESFIA+D framework and the work of Wiek et al. (2011) that informed UNESCO's (2017) eight competences for sustainable development. The resulting framework comprises 12 competence statements (on systems, futures, participation, attentiveness, empathy, engagement, transdisciplinarity, innovation, action, criticality, responsibility, and decisiveness), each with 3 learning outcomes that are further defined with the support of a number of underpinning components. In this way the framework provides enough detail to make it practical for use in developing training programs while leaving it open for each user to integrate it into their national qualification framework using their own template to define assessable learning outcomes (see also Vare 2018; Vare et al. 2017).

Once the draft framework was agreed, training programs for pre-service and in-service educators were developed. The training programs provided opportunities for reflecting on and discussing the impact of competence-based professional development on ESD. The current paper presents the outcomes of a teacher education program based on ESD competences delivered in Cyprus.

### ESD Teacher Professional Development and Education Models and ESD Transformation in Schools

The support and reinforcement of competence-based teacher education on ESD acquires a special meaning if we consider the limitations that initial teacher education poses in competence transfer and practical pedagogical skills development (Ferreira et al. 2007; Duncombe and Armour 2004) and the need for education to lead to action and change. In this context, EU reports and actions acknowledge the importance of in-service training (INSET) and the need for its reform (European Commission 2003a, b, 2004).

Teacher professional development and education on ESD needs to be aligned to ESD characteristics and principles. It should therefore draw from models of education and training that promote learning as an independent and documented activity that is constructively critical in its practice and situated in a framework of critically viewed



professional values and responsibilities (Bolan 2000; Zachariou 2013). For ESD delivery, this scope of teacher education and training is particularly important if we consider that the key expected outcomes of education (action and participation, responsibility, and the ability to effect change) are rarely achieved by schools (Wilkinson and Waterton 1991; Shallcross and Wilkinson 1994).

Ferreira et al. (2007), having studied a number of teacher education initiatives for promoting ESD, identified three broad models for reorienting teacher education toward sustainability and achieving change.

The *Collaborative Resource Development and Adaptation Model* assumes that change can occur through the provision of curriculum and pedagogical resources and adequate training in the use of these. It can access a large target audience at low cost. The resources are often developed along with professional development and can be improved through collaborative development processes that target not only curriculum but also pedagogical and philosophical change.

Initiatives following the *action research model for teacher education* aim to build educators' competence to deliver curriculum and policy by following the four-phased cyclical process of critical inquiry: plan formation, action, outcome observation, and reflection. This process provides the practitioners with the opportunity to reflect upon, improve, and innovate their practice (Tilbury et al. 2005). Action research as a model for ESD teacher education was also explored by Cebrian et al. (2012). The researchers argue that there are many types of action research approaches used in a variety of disciplines: participatory action research, emancipatory or critical action research, collaborative inquiry, active learning, and narrative inquiry.

Finally, Ferreira et al. propose the *Whole-of-System Model*. This is a complex model which assumes that change toward sustainability will only occur through leveraging top-down and bottom-up approaches to change simultaneously in a multifaceted, system-wide manner. The model is not prescriptive as it enables contextually specific strategies to be developed.

The demanding need for ESD competences' development and the complexity of the nature of

ESD require the use of elements from more than one of the teacher education models or even a combination of the models if such an education and training is to be effective (Zachariou 2013).

### **ESD Teacher Professional Development and Education in the Cyprus Context**

Sustainable schools in Cyprus are at the core of the new ESD curriculum. Each school is expected to develop and implement its individual Sustainable Environmental Education Policy (SEEP). This conducted to a demand for skilled and competent teachers of ESD, which in turn makes teacher education and especially ESD teacher education a high priority in Cyprus' educational reform (Zachariou and Kadji-Beltran 2015). In response, the Cyprus Pedagogical Institute (CPI) has developed diverse ESD teacher education courses, addressing teachers of all levels of formal education. Compulsory courses focus on the implementation of the National Curriculum on ESD, planning and designing the SEEP, schools' self-assessment of ESD implementation, and the use of ESD educational tools and materials (MoEC 2013; Zachariou 2013). Optional ESD courses are implemented in educational settings like Environmental Education Centers, museums, and in outdoor environments. The courses introduce participants to subjects such as sustainable schools; the theory, methodology, and pedagogical techniques of ESD; the use of outdoor settings as a pedagogical mean for promoting ESD through formal and nonformal education (MoEC 2008, 2009); and designing ESD projects through parental involvement and local community collaborations (Zachariou and Symeou 2008). Alternatively, they can take the form of school-based seminars and focus on the needs, interests, and priorities of the schools. Most of the courses have both a theoretical and a practical structure (CPI 2009).

Despite substantial progress in the field of teacher professional development and education for ESD, the Cyprus educational system is still far from moving from the transmissive to a transformational model for teacher education in ESD. Research conducted with school principals and educators indicates that teachers have limited self-efficacy for delivering ESD to their classes

(particularly with planning ESD lessons using ESD teaching materials and the ESD curriculum), establishing links with the local community and applying ESD educational approaches emphasizing the need to reorient education toward holistic programs based on teachers' competences (Zachariou 2013).

Teachers' professional development and education is the driving force within the Cyprus Ministry of Education's efforts to raise quality in education. It is aligned to the newly emerging unified policy and the new system of professional teacher education based on professional learning instead of development (Ministerial Board 2015, no.79.273/19/8/20180). Therefore, the purpose of the current paper is to contribute to the overall effort (nationally and internationally) for raising the quality of the delivery of educational programs and redesigning ESD programs by evaluating the use of the RSP model, as a simple and solid model that supports and facilitates the development of ESD competence-based teacher education courses.

## Methods

The research took the form of a case study of an ESD teacher education program that aimed to scrutinize and transfer ESD competences to a group of educators in Cyprus. The program was delivered as part of the requirements of the RSP project previously presented. It explores (a) participants' experience with ESD competences prior to the program, (b) their ideas and perceptions about how ESD competences support the ESD curriculum implementation, and (c) how RSP competences can help the development and delivery of a whole school ESD policy.

## The Training Program

The 10-h training program was developed according to the Collaborative Resource Development and Adaptation Model (Ferreira et al. 2007) and was attended by 32 educators. The goal was to help trainees become familiar with key ESD competences and experience activities that support their development. Training started with a plenary session on the concept of "competence" in order to clarify terms and eliminate misconceptions. It presented the RSP competences and discussed the importance of their integration in teaching and

learning and their connection with the development of a whole school ESD policy. Three parallel workshops (on Systems Competence, Empathy, Transdisciplinary, Futures, Attentiveness and Evaluation competences) presented and implemented the teaching material produced for each competence by the RSP project. This practical engagement was expected to encourage teachers to integrate ESD competences in their planning, in their teaching and learning practice, as well as in their schools' ESD policy. A closing plenary session discussed each workshop and gave the participants the opportunity to reflect upon their experience.

Thirty-two individuals participated in the educational program after responding to an open invitation, addressing educators. Nineteen of them (16 women and 3 men) also volunteered to participate in structured interviews exploring their experience with the program and discussing implications for their education. Three of the interviewees were unemployed teachers, three were novice teachers (<10 years of experience), ten had 11–20 years of experience, and three teachers had more than 20 years of experience. The majority were primary school teachers, three were pre-primary teachers, and three were biology teachers in secondary education. All of the interviewees had a special interest and specific studies in ESD through postgraduate courses. Most of them were involved in ESD programs in their schools or worked as educators in nonformal education (Environmental Education Centers). A few were also involved in the development of the ESD curriculum. Several participants had occasionally received professional development through conferences, seminars, and in-service training and participation in ESD research projects. In the current paper, we only present the interview data related to the three stated research objectives. Data analysis followed a qualitative approach (content analysis). Quotations from the interviews will be referred as Interviewee 1 (I<sub>1</sub>), etc.

## Findings

### Prior Experience with ESD Competences

Being ESD professionals, most interviewees had some experience with competences in the context of ESD. Some explained that they had come

across ESD competences through professional development seminars and scientific articles (four) although one admitted that “Despite my long experience as an EE advisor and EE trainer in EE Centres, it is the first time I attend a seminar focused on ESD competences” (I<sub>4</sub>). Eight interviewees explained that they experienced ESD competences during their ESD postgraduate studies or university studies briefly and superficially: “... very general and superficial mentioning of competences in one of the modules I attended during university studies” (I<sub>1</sub>). Other participants came across ESD competences through their participation in research projects (concerning ESD professional development or specifically ESD competences) in an indirect and theoretical way.

Participants employed in positions outside formal education appeared to also engage with competences due to their work. Environmental Education Center educators (five) had to consider competences when developing the educational programs of the centers: “...for the development of EE/ESD programmes in the EECentre I am working, I had the opportunity to work with some competences (e.g. systems) while I have worked less with others (e.g. empathy)” (I<sub>3</sub>). An ESD school advisor and a public servant (environmental inspector with a background in education) also had to address ESD competences as part of their work. The environmental inspector mentioned that she used the ESD competences “...for developing a proposal on professional education for transferring knowledge, skills and competences for new sustainable methods in agriculture...” (I<sub>2</sub>), while the school advisor also working as a teacher trainer addressed ESD competences for the delivery of ESD INSET “...so as to encourage teachers to take action for SD...” (I<sub>5</sub>).

School teachers that reported working on the development of ESD units within the new national curriculum and setting ESD achievement indicators explained that these were developed following a transdisciplinary, collaborative, and experiential learning approach and took into account the ESD competences (I<sub>6</sub>, I<sub>5</sub>). Most of the school teachers/practitioners (five) explained that they had to consider ESD competences “on a practical level while teaching” (I<sub>6</sub>, I<sub>4</sub>, I<sub>7</sub>) and while working on the Sustainable Environmental

Education Policy (SEEP) of their schools: “... I was quite familiar with the ESD competences presented in the workshop, since our SEEP addressed 5 sets of competences: knowledge, systemic thinking, senses, values and action...” (I<sub>8</sub>).

### Teachers’ Ideas on How ESD Competences Support the ESD Curriculum Implementation

The interviewees explained that understanding competences is the first step to understanding how these can be applied in classroom. They acknowledged that all competences are necessary for the national curriculum delivery and the development of the schools’ SEEP. They also considered that specific competences might be required for specific curriculum areas: “...delivering ESD in different lessons mainly requires systems competency, empathy, transdisciplinarity and evaluation” (I<sub>9</sub>) and found the use of these competences easier.

Specifically, five interviewees pointed out that acquiring ESD competences gives depth to understanding and constructs a solid theoretical background for ESD. Competences and indicators of achievement are specific; they clarify what is pursued and support the achievement of the curriculum goals: “... competences are a tool supporting ESD in both formal and informal education. They are our guide... They are aligned to the new role that teachers need to embrace in order to educate in a changing world” (I<sub>9</sub>) (I<sub>10</sub>).

Five participants considered that teachers can transfer competences in a practical way and provide a cross-disciplinary and systemic framework for addressing SD issues. Cross-disciplinarity promotes collaborations between different subject areas and encourages everyone to engage. “...The educators that possesses these competences can understand the systemic character of SD issues, acknowledge the principles of interdisciplinarity in ESD, seek to collaborate with individuals from other scientific areas, are able to evaluate, to act with transparency and recognise their personal responsibility...” (I<sub>11</sub>).

Some interviewees explained that the pedagogical value of competences lies in the connection they have with specific educational approaches and techniques. In this sense, competences enhance and facilitate the ESD curriculum delivery. Competence-oriented ESD encourages

effective planning and gives a clear focus to the process of teaching and learning. "...holding these competences will help educators implement the Curriculum starting with planning and organising, choosing the topic, the activities, raising awareness and finally evaluating..." (I<sub>12</sub>). On the other hand, some interviewees highlighted that the ability to set appropriate goals and use a variety of teaching approaches and techniques is what enables the development of the various competences (I<sub>13</sub>) (I<sub>12</sub>), (I<sub>7</sub>).

Finally, interviewees discussed how different competences enable them to achieve different ESD goals. Competence-oriented ESD can help students become self-aware (I<sub>17</sub>) "... and able to assess and critically view their role concerning certain issues" (I<sub>13</sub>). It can raise their awareness toward their fellow human and other living creatures (I<sub>17</sub>), (I<sub>15</sub>), (I<sub>1</sub>): "Through empathy you can approach children's ethics code. Communication and interaction, e.g. through moral dilemmas, can lead them to reflection and reconstruction of their personal values through critical thinking and participation... bring about change in their personal lives and assist through alternative actions the shaping of a sustainable future" (I<sub>14</sub>). They mentioned that ESD competences help them approach SD issues in an interdisciplinary (I<sub>17</sub>), (I<sub>2</sub>), (I<sub>6</sub>) holistic and critical manner (I<sub>2</sub>), (I<sub>15</sub>), (I<sub>14</sub>), (I<sub>16</sub>), (I<sub>4</sub>), (I<sub>12</sub>). Through systems, competency teachers can help children understand how everything in our world is interconnected (I<sub>17</sub>) (I<sub>11</sub>), (I<sub>14</sub>), (I<sub>3</sub>), how their actions can cause chain effects (I<sub>17</sub>), (I<sub>11</sub>), and how after examining the consequences children can visualize different versions of a sustainable future (I<sub>3</sub>), (I<sub>4</sub>). Attentiveness is deemed necessary for identifying non-sustainable practices and achieving change (I<sub>17</sub>). Evaluation can help teachers evaluate, in a critical way, sources, models, and theories and transfer this competency to students (I<sub>17</sub>), and empathy leads to the development of a moral code and change starting from within (I<sub>14</sub>).

*... the development and delivery of educational programmes at all levels of education, is founded on competences: holistic thinking and vision for change are important for bringing change. Teachers should help students see the interconnections amongst social and natural world (e.g. using cane for weaving) and examine the consequences of*

*their actions... draw their attention to the most urgent non-sustainable aspects of the area and its community seek alternative versions of a sustainable future and be able to contribute to changes that would support SD. (I<sub>4</sub>)*

Overall, most interviewees explained that ESD competences promote a new way of thinking that will enable change in the school culture and help teachers realize the new role they have. Most importantly, they acknowledge the connection between ESD competences' development and action: "...They [ESD – competent teachers] take action and motivate their students to do the same, resulting into the pursued change that would transform their school into a sustainable school" (I<sub>11</sub>).

### **Teachers' Ideas on How ESD Competences Support the Development of a Whole School ESD Policy (SEEP: Sustainable Environmental Education Policy)**

Acquiring competences makes them **transferable** in schools and EE Centers: "if for example a teacher does not have developed systemic thinking, how can s/he transfer it to his/her students... how can s/he help them make the connections between complex social and environmental issues... evaluate and think critically of the available information taking into account all involved parties?" (I<sub>8</sub>). Therefore, as interviewees argue, acquiring competences raises teachers' self-efficacy and helps them become able to create the conditions necessary for **achieving sustainability**.

Interviewees commented that competences could help teachers **transform schools** (I<sub>11</sub>) into dynamic, self-regulating, self-evaluating, and organizing systems able to interact with their communities and other parties. (I<sub>2</sub>) (I<sub>6</sub>). They can help teachers become **creative and innovative** and consequently help their students also become creative. Within such context, students can engage in exploring SD issues (I<sub>13</sub>), "...understand the interconnections, the consequences of their actions and the need for change... They will be able to envision a sustainable future, identify solutions and mainly become active citizens" (I<sub>11</sub>).

Competences-oriented ESD is considered by most of the interviewees to be helpful for the

development and implementation of a whole school's "Sustainable Environmental Education Policy" as all competences are needed for its development. Several interviewees (I<sub>17</sub>, I<sub>5</sub>, I<sub>4</sub>, I<sub>10</sub>) share the view that "ESD competences will help [me] develop and implement my school's SEEP. I will have the competences needed to challenge my students, in order to express themselves, investigate, evaluate and reflect upon a sustainable future..." (I<sub>17</sub>). One of the interviewees even stated that ESD competences help her to better understand SEED (I<sub>14</sub>).

The ESD competences' practical value within SEED development was identified in the fact that they can help teachers plan and apply a unified strategy for improving the school unit in the framework of SD, leading to a gradual change of the school culture (I<sub>2</sub>), (I<sub>15</sub>, I<sub>16</sub>, I<sub>10</sub>): "... Competences need to be accounted for during SEEP development. This will result into more focused and quality SEEPs" (I<sub>6</sub>); "They result to better planning of the SEED, better implementation, better evaluation and revision" (I<sub>3</sub>, I<sub>13</sub>, I<sub>7</sub>). The program helped teachers understand how to choose suitable activities/teaching techniques for the SEEP in order to develop competences (I<sub>15</sub>, I<sub>8</sub>, I<sub>14</sub>, I<sub>13</sub>). Most importantly, they realized "which parameters have to be considered in order to implement the SEEP... for each step of the school policy development, different competences are needed. In order to implement SEEP, teachers need all these competences and use them through all stages of the policy" (I<sub>11</sub>).

Overall, the orientation toward ESD competences was considered necessary for the development and delivery of action in schools (I<sub>6</sub>), (I<sub>3</sub>), (I<sub>4</sub>).

## Discussion

Research findings indicate that informal learning contributes to developing competences because it is integrated in activities (Dohmen 2001, as referred in Barth et al. 2007, p. 24). Accordingly, Marsick et al. (in Overwien 2005, p. 344) stated that informal learning directing the attention to the learning process could strengthen the capacity for reflection, by creating an atmosphere of

cooperation and confidence. Schoolteachers were able to identify and acknowledge the links between different tasks performed at school for ESD implementation and the competences after they received the RSP ESD competence-based educational program. Outcomes indicate that while the Cyprus ESD policy is being delivered by the practitioners and competences development is identified throughout different levels of its implementation (curriculum delivery and whole school policy – SEED), this process is not conscious conscientious and reveals a gap between policy and its practical delivery. The missing element is appropriate ESD teacher education. This conclusion is particularly important if we consider that the research participants were individual educators with special interest and additional preparation on ESD delivery. Interviewees' responses reveal the need for enactment of a unified policy regarding teachers' ESD competence-based education, which will enable them to self-organize their professional learning, to take the responsibility for their own learning and development, and to become important agents of educational change (MoEC 2015; Donaldson 2001). This requires teacher education programs on ESD, based on the action research professional education model as a participative form of education that places learning responsibility to the learner. Action research is a holistic and long-term model and addresses the national and local priorities and the individual needs on ESD (Karagiorgi and Symeou 2006; Somekh 2006, p. 8).

The fact that teachers felt that the competences support implementation of the ESD curriculum suggests that teacher education programs on ESD should be redesigned according to ESD competences frameworks (and RSP model in particular). This enables teachers as educators and learners to reflect on the education they deliver and to consider different disciplines with regard to their relation to the world, to life-worldly goods, and to other disciplines (Defila and Di Giulio 1996, as referred in Barth et al. 2007, p. 133). Findings also indicate that competences support teachers in responding to the complexity of these interconnections and the "osmosis" needed for

bringing together the different subjects. There is a need for developing ESD teacher education programs that would provide interdisciplinary opportunities on ESD supporting the development of ESD competences (Barth et al. 2007). Results that support the pedagogical value and the action orientation give competences a practical value and explain why teachers considered that the RSP ESD competences help them support the implementation of the ESD curriculum. According to this, ESD teacher education should address ESD competences as the basis for more effective curriculum design and pedagogy and link them to the assessment of processes and outcomes (Mochizuki and Fadeeva 2010, p. 393).

Participants' observation on how important RSP ESD competences are in order to give depth to understanding and construct a solid theoretical background for ESD points toward a currently superficial ESD delivery. This needs to be addressed through ESD competence-based teacher education that will complement ESD 1, which reflects a more instrumental view of education that tends to be driven by policy makers, with ESD 2, a capacity-building and open-ended process that provides teachers with opportunities to see themselves as reflective learners (Vare and Scott 2007).

The potential of the RSP competences model as a transformational force stands out in the teachers' answers about the development and delivery of a whole school ESD policy. They also argue that competences are necessary for action. Their answers indicate that the RSP competences help them understand better the theory behind the whole school policy framework as well as the "hows" and "whys" concerning its development and implementation. Competences give teachers the freedom and confidence to plan, design, and choose suitable approaches and activities to achieve different goals. Most importantly, they become aware of their role and that of all the different actors within a whole school ESD policy for achieving change and shifting ESD practice into a deeper and more effective delivery. Competences support the dual role of educators as members of the organization and members of society. Educators are in a dynamic connection with their students, their peers, and the society in

ways that promote change (see also Sleurs 2008). The RSP ESD competences cover aspects such as transdisciplinarity that goes beyond transformative learning among students and teachers in order to engage stakeholders and civil society. This highlights the cultural context, which is critical in promoting the organizational change processes required to achieve a whole institution approach (Cebrian and Junyent 2015; Cebrian et al. 2012; Mochizuki and Fadeeva 2010).

The educational program was illuminating for the participants, helping them realize the theory and foundations of what they were practicing. Teachers responded positively to the education received. They considered that it helped them understand competences better and encouraged them to employ competences in their efforts to achieve change. There is an urgency to reexamine the way in which ESD competences are seen in the educational systems and teacher education specifically. ESD competences are not "laundry lists," lacking concrete and explicit theoretical justification (Wiek et al. 2011), but the intrinsic ingredient for ESD teacher education as third-order transformational learning (Balsiger et al. 2017). Transition springs from the experience of recognizing our own worldview rather than simply viewing our world so that we can be more open and draw upon other views and possibilities.

## Concluding Remarks

The current paper presents the case study of a teacher education program within a specific context with particular characteristics and limitations concerning the duration of the program and the assessment of the competences exclusively during the program implementation (and not during classroom practice). Nonetheless, useful outcomes about the need for refocusing teacher education on the basis of the RSP ESD competences emerge by revealing important aspects that should exist in ESD competence-based teacher education and which concern the dynamic of competences themselves: (a) to contribute to reorienting schools toward a holistic school approach, (b) to reveal the teachers' multiple roles, and (c) to redefine



the professional learning process itself. We do not claim that this paper provides extensive answers regarding ESD competences and teacher education, but the findings can be used to fuel further research in the field addressing questions such as:

- (a) How is ESD professional learning connected to various models of professional education?
- (b) Which elements of other professional development models can facilitate the development of ESD competence-based education courses?
- (c) How and in which ways can action research, as a model of professional learning, integrate professional communities of learning based on ESD competences?
- (d) What elements of formal and informal/non-formal settings should be integrated in designing ESD competence-based education so as to make it more effective?

There is clearly more to be done, but the work outlined above points to an immense potential of a well-defined and accessible competence framework in engendering positive change in education.

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et al. 2007) by engaging in behaviors such as helping, sharing, donating, cooperating, and volunteering as well as complying with the rules and remaining compatible with socially accepted behaviors (Brief and Motowidlo 1986). These actions stem from a range of motivations, whether sympathy or concerns over welfare, egoistic or practical concerns, such as the individual's social status and reputation (Eisenberg et al. 2007). As such, altruism and empathy feature among the relevant motivating factors (Straubhaar et al. 2009).

Altruism might be considered as a “sub-category” of prosocial behavior. Borden and Francis (1978) theorize that (i) individuals with strong individualistic and competitive orientations are less likely to act ecologically and (ii) individuals who have satisfied their personal needs are more likely to act favorably regarding their natural environment because they have greater resources for caring about other issues.

The prosocial behavior concept, often associated with morality (Batson et al. 2002), was initially applied to children, mostly in the in-classroom context. In fact, prosocial behavior may generate significant impacts on student motivations for learning, fostering positive traits of benefit both to children and to society. However, while the term often remains associated with developing desirable traits in children, the literature on the theme has expanded greatly since the late 1980s and now includes adult behaviors as well (Eisenberg et al. 2007). The term began simultaneously getting applied to other contexts such as volunteering, environmental protection, social awareness, consumption, etc. Thus, the social context of behavior and the belief in how other people perceive a particular behavior may constitute an important driver of environmentally aware behavior (Welte and Anastasio 2010). Furthermore, the social context in which an individual is inserted may restrict, support, or disrupt individual goal-seeking behaviors, by imposing certain rules and values that get attached to individual decisions and then persuade persons to behave in certain ways. Social context and beliefs in how other people perceive a certain behavior may thus provide important drivers of prosocial behavior.

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## Progress

- [Social Welfare and Sustainability](#)

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## Prosocial Behavior and Sustainable Development

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### Definition

Prosocial behavior is considered a social behavior that benefits other individuals or even the society as a whole, comprising actions such as helping, volunteering, donating, or sharing.

### Introduction

Prosocial behavior represents voluntary behavior intended to benefit either another individual or society as a whole (Aronson et al. 2005; Eisenberg

Understanding the roots and the causes of prosocial behaviors thus appears crucial not only to limiting harmful conducts but also to promoting acceptance and integration, to nurturing innovation through collaboration, and to fostering sustainable economic development and welfare in society. Traditionally, the majority of researchers have focused either on the situational determinants of prosocial behaviors or on the educational and socialization practices favorable to such prosocial stances and attitudes. However, some emphasis is also placed on psychological structures in keeping with how differences in individual personal traits, values, and beliefs have returned explanations about the variability in prosociality (Caprara et al. 2012).

Thus, pro-environmental behaviors class as “prosocial” as they benefit other people, often with some direct costs to the individuals themselves. Such individuals understand that their behaviors may return positive consequences for others even while this does not mean that their motivations are purely prosocial. There is a greater consensus around pro-environmental behaviors ranking as prosocial out of the individual recognition that their actions help bring about environmental preservation and long-term health and well-being of society. This text focuses precisely on the prosocial concept within the context of environmental behavior.

### Prosocial Behaviors Within the Context of Environmental Preservation

Authors such as Ellemers et al. (2002) defend that social identities strongly influence behaviors, and behavioral models usually apply identity to bind the weak connection between environmental concerns and behaviors. Nevertheless, the following theoretical question remains to be answered: How do identities interact with social contexts in determining pro-environmental behaviors? Brick et al. (2017) state that social identity may lead to environmentally friendly behavior through two processes: (i) identity consistency (environmentalists themselves get involved in more pro-environmental behaviors, due to the identity-consistency of

behaviors functioning as a guide for desirable actions) and (ii) identity signalling (a valued social identity drives identity-associated behaviors when behaviors are visible or signalled to others and thereby influencing reputations).

According to Zabkar and Hosta (2013), two proposed theories might explain how engagement in environmentally aware behavior can increase personal status. Firstly, *Costly Signalling Theory* states that commitment toward (costly) environmentally aware behaviors shapes a prosocial reputation and raises personal status by conveying the willingness and capability to sacrifice for the benefit of a group. In turn, *Status Characteristic Theory* proposes that status characteristics consist of interpersonal traits that influence beliefs.

Individuals may act prosocially to benefit other people or themselves. One frequently used model, which considers expected outcomes for others to explain prosocial behaviors, is the *Norm Activation Model* put forward by Schwartz (1977). This model has been successfully applied in predicting several prosocial intentions and behaviors, for example, donating, volunteering, and helping out in critical contexts and situations (Groot and Steg 2009). During recent decades, there have also been a growing number of empirical studies advocating the *Norm Activation Model* for the environmental context, such as energy conservation, willingness to pay for environmental protection, recycling, and general environmentally friendly behavior (Groot and Steg 2009). There has correspondingly been convergence among authors that pro-environmental behaviors represent a special case of prosocial behavior because they also imply that people may benefit others even while there are often no direct individual benefits received for engaging in these behaviors. The benefit is rather directed to the overall society and environmental preservation.

Other authors base their models and assumptions on theories of altruism, through defending how altruism both requires and supports pro-environmental behaviors, as is the case of Allen and Ferrand (1999), who tested the *actively caring hypothesis* proposed by Geller (1991). In parallel to the altruism theory of Schwartz (1977), Geller (1991) hypothesized that in order to act

pro-environmentally, individuals must focus beyond themselves and be worried about society as a whole. Geller (1991) suggested that this state of “actively caring” would only occur when the need for self-efficacy, confidence, self-esteem, belonging, and personal control were satisfied. Deploying a similar approach, Allen and Ferrand (1999), in their research findings, reported that self-esteem and belonging did not interrelate with pro-environmental behavior but that there was a significant association between personal control and empathy, which the authors applied as their measure for “actively caring.”

Environmentally friendly behaviors vary in their visibility to other people; for example, when an individual’s identities align with a particular behavior, social visibility may increase the frequency of that behavior. Thus, individuals generally engage in more prosocial behavior when their actions really are visible to others. Should individuals feel they are under observation, they tend to increase their pro-environmental behaviors, preferring eco-friendly products and littering less. However, the fact that visibility leads to prosocial behavior implies that the behavior is signalling desired characteristics and traits and with the identity consistency and identity signalling models leading to different predictions about visibility (Brick et al. 2017).

When it comes to the question of prosocial behaviors, speaking of social identity is inevitable. The identity consistency model holds the prediction that environmentalist identities interrelate with more environmental friendly behaviors. Conversely, the identity signalling model leads to the prediction that the association between environmental identities and pro-environmental behaviors emerges as stronger in the case of observable activities. Therefore, according to Brick et al. (2017), the effect of identity on behavior may turn out positive for environmentalists or negative for anti-environmentalists. For instance, when an individual carries out pro-environmental behavior, such as recycling or biking instead of driving, observation by other people may create a motivation to signal valued group membership and thus intensify certain behaviors.

Furthermore, environmental identity can be conceptualized as incorporating how individuals think and act regarding their personal relationships with the natural environment and the role of humans on earth (Clayton 2003). Stern (2000) refers to how this identification with the environment is generally assumed to be triggered by environmental values and from the influence of attitudes, personal norms, intentions, and behaviors. The question, however, also extends to what the environmental identity really involves as some individuals consider that a single action or unique behavior, such as purchasing an electric vehicle or buying energy efficient equipment, meets the standard of acting sustainably.

### Intention Versus (Prosocial) Behavior

The relationship between values, attitudes, and behavior is complex; researchers differ over the actual degree of correspondence between people’s avowed feelings and beliefs and their subsequent actions. However, with attention paid particularly to research design and the cognitive processes concerning attitudes, studies have now demonstrated that there is a link between beliefs, attitudes, and planned behaviors (Ajzen and Madden 1986), even while this link is often indirect and strongly dependent on other variables. A number of advanced models have been developed to test the mediating and moderating influences of particular variables on the attitude to behavior link in addition to the specific conditions whereby attitudes may impact upon behaviors. Cleveland et al. (2005) state that general environmental attitudes, such as environmental concerns, tend to be poor predictors of behavior. On the contrary, Balderjahn (1988) concludes that individuals who hold positive attitudes toward the environment were more likely to purchase and consume green products. Laroche et al. (2001) lend further support to this argument in suggesting that attitudes, as opposed to knowledge, provide the most accurate predictors of consumer willingness to pay more for environmentally friendly products. Regarding environmental knowledge, several



research studies have attempted to explain the gap between this variable and environmental awareness and consequently displaying pro-environmental behavior. However, there have been no definitive answers about this relationship (Kollmuss and Agyeman 2002).

The gap between intentions to act and current environmentally friendly consumption patterns is addressable through the moderating role of prosocial status perceptions (Zabkar and Hosta 2013). For some individuals, real environmental concerns constitute a good motivation for acting in environmentally aware ways, but for others, such concerns might better interrelate with their self-interests and convenience. Complementarily, Kumar and Ghodeswar (2015) add that the perceptions of others about one's behavior contains considerable influence over consumer green product purchasing behaviors. Consumers buy green products when they represent publically recognized symbols of supporting environmental protection, convey the self-concept of consumers, and communicate desirable social meaning. Granovetter (1985) also emphasizes that purchase behaviors are embedded in social interactions and may address financial needs as well as social and esteem needs.

Green products provide a good example of products bearing a high symbolic value and consumed in social environments in which people usually try to positively present themselves to others through their behaviors and belongings. The propriety of products helps people define themselves and express their self-identity to others in order to gain emotional pleasure from social interactions. A higher perceived status in society stands out as one of the potential long-term individual benefits gained from environmentally conscious behaviors (Zabkar and Hosta 2013). The main finding of Zabkar and Hosta (2013) indicates that prosocial status perceptions of environmentally friendly consumer behavior can help reduce the gap between the willingness to act in an environmentally friendly way and actual environmentally friendly behavior. In the current market situation, where environmentally friendly products are still considered more costly but are simultaneously becoming more

fashionable, status-based appeals may prove very successful. Another finding stems from how perceptions of prosocial status hold greater relevance for women and correspondingly revealing gender-based differences.

In other research, Osgood and Muraven (2015) propose that prosocial affects and cognition are not in themselves enough to bring about prosocial behaviors and that such affects and cognition may not be consistent with their corresponding behaviors. Their research results report that efforts aimed at increasing prosocial behaviors (e.g., green behaviors, charitable giving, etc.) should focus not only on promoting prosocial attitudes but also on reducing the perceived costs and/or inconvenience to the self. Concentrating exclusively on promoting prosocial attitudes are unlikely to succeed as many non-prosocially behaving individuals already harbor prosocial attitudes. Osgood and Muraven (2015) also point out that individuals may experience motivational conflicts between preferences to do that which is in the interest of others and a temptation to act selfishly. Thus, to act on their prosocial motivations, individuals must overcome their "proself" motivation. As Ottman (2011) states, for some consumers, concern over the environment and common good constitutes the main reason for acting in an environmentally aware way while, for others, such concerns are more closely related to their own interests.

## Conclusion

The wider set of motivations shaping the social conduct of individuals and how these motives actually interrelate with each other as well as the surrounding economic environment provides a constantly relevant field of research. As already demonstrated, providing rewards and punishments to foster prosocial behavior may incur perverse effects in reducing the total contribution made by individuals acting in prosocial ways. Thus, some economic actors are now deploying new instruments to encourage such behavior, including those produced under the auspices of social marketing.

A limitation to most studies in this field derives from their assessment of prosocial intentions and self-reported behaviors, instead of actual behaviors. Therefore, it might perhaps be a good option to include behavioral measures in these studies, mixing them with prosocial intentions and self-reported behaviors because people are prone to overreacting when reporting prosocial intentions and behaviors due to the social desirability effect.

In terms of future research, this needs to seek out more direct measures of both prosocial and proself motivations, affects, and cognitions, because as much as people care about the opinions others hold of them, they also care about their self-image. Additionally, values such as collectivism and individualism require analyzing in this context.

Clearly, promoting prosocial behaviors may require reducing or eliminating undesirable social behaviors, and it is interesting to note how some incentives (e.g., economic advantages) and cultural values are able to motivate people to act pro-environmentally. By imposing taxes on environmentally damaging activities, for example, people automatically move away from these behaviors and switch to more sustainable patterns. By communicating and educating individuals, more prosocial behaviors will also be able to emerge.

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## Prosperity

### ► Social Welfare and Sustainability

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## Provision

### ► Reduction in Consumption for Sustainable Development

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## Public Policies on Education for Sustainable Development

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## Definition

Public Policies on Education for Sustainable Development focuses on policy options to improve the integration of environmental considerations into the working of the economic system and to address some of the social and educational consequences of better integration. High priority needs to be put on building stronger support within governments and society for comprehensive implementation of sustainable development policies. Sustainability depends on maintaining basic ecosystem services, a healthy environment and cohesive societies and balancing these elements will require stronger public policies on education.

## Introduction

The concept of Sustainable Development became known and widely used after the publication

of the Brundtland Report, which resulted from work in 1987 by the United Nations Commission on the Environment and Development in 1987 (UNCED 1988). However, judging by the number of problems that the definition of Sustainable Development poses, and even by its amplitude, it is to be expected that different positions, visions, and versions have emerged and been consolidated over the last few years.

The idea of Sustainable Development, in some interpretations, shows alternative ways in which society could develop; but in other interpretations, unfortunately, such alternatives have been misinterpreted. That is why, in some interpretations, Sustainable Development, by virtue of the propositions examined in this entry, has been seen, mistakenly, as a barrier to the advance of industrialization and even to the development of means of production.

However, Sustainable Development is not aimed at preventing economic growth and social advance; rather it aims to support the creation of a model of human, social, economic, and, chiefly, environmental development in a more conscious and balanced way, focused on concern for the future (Murphy 2012).

It is well known that there are a number of interpretations of the concept of Sustainable Development, which Giddings et al. (2002) state is widely debated in a range of meanings. This is because, according to these authors, the concept is embraced by great companies, governments, social reformers, and social activists, all of whom put their own interpretation on what Sustainable Development means.

From this perspective, Dryzek (2005) recognizes that there are several approaches to environmental issues and to the concept and analysis of Sustainable Development, and he emphasizes that there are several environmental discourses which in some cases complement each other but also compete in solving environmental problems.

According to what Cavalcanti (1995, 1999) had noticed, the concept of Sustainable Development proposes an alternative to the traditional theories and models of development, worn out in an infinite series of frustrations.

As far as the environment is concerned, such analysis is necessary in view of the fact that, as we know, today's society has developed a consumerist culture and, in addition, is insufficiently concerned about environmental issues. In fact, as one generation succeeds another, there is, worldwide, a growing detachment from the idea of conserving material goods and maintaining their durability.

In other words, modern generations see the promotion of the idea of disposable goods and the substitution of what is new, or most modern, or even most current. The big problem is that to promote this constant substitution, as fast as technologies advance, and follow what human creativity is able to produce (as a novelty), everything that is outdated tends to become more and more obsolete and unusable. In the sequence, they are discarded, becoming a sort of "rubbish," which increasingly accumulates in the environment.

The most disturbing thing, among so many, is that this "throw away" culture has become, over time, so ingrained, that industry itself is producing consumer goods which are suitable for discard after little use.

As is well known, smartphones, computers, the recent *Tablets*, in addition to home appliances, televisions, and even other consumer goods, such as shoes, clothes, bags, among others, are being produced by industry in order not to have, in practice, a long expiry date. Thus, such goods become obsolete in a short time, so that they necessarily must be replaced.

The tendency is that, over time, more and more materials and goods are disposed of, to the point where the amount of "garbage" accumulating on the planet is beyond measurement.

In face of all these socio-environmental problems, some questions arise which are particularly troubling, especially for those who have already realized the need to maintain a balanced and sustainable environment. For example, What happens to used products? Where does the waste caused by production processes end up? What is done, collectively and individually, to avoid environmental impacts?

When thinking about the answers to such questions, one is aware that nation states do not

have enough structure to properly recycle and/or correctly deposit all the rubbish that is currently produced by society. There is no doubt that much, if not most, of the waste produced accumulates in deposits which pollute the environment, often with irreparable consequences.

Thus, the only feasible way to curb the damage being done by human beings involves the awareness that it is necessary to reduce over-consumption. This implies conserving consumer goods as much as possible and, when it is unavoidable to discard, that it is done correctly, in appropriate places and whenever possible items are reused or, wherever possible, recycled.

Such awareness, however, is not easily achieved. It necessarily involves, above all, a significant change in the culture of society members. This context demands no less than a decisive change from a culture of discarding, to a culture of conservation, preservation, and concern for the environment in which society lives. Thus, this study seeks, in the face of this entire problem, discussion of a matter of paramount importance to the aforementioned needs:

How can we educate and raise the awareness of the population so that each individual can feel disturbed about these issues? Similarly, how to educate the population and raise awareness in order to develop an understanding of what the necessary aim, that is, to inculcate the idea of preservation and care for the environment in which human beings live, over against the idea of exaggerated and unnecessary consumerism and undue and unconscious disposal?

To answer such questions, several different approaches are necessary, because members of society differ in their backgrounds, experience, and attitudes. A leading approach must be education. With proper education, directed and focused on highlighting such points, it is possible to achieve some, if not all, of the objectives set out above.

Education is also a duty of the State, which must inevitably be the main protagonist initiating this awareness. The State, as a representative entity of a general will (society), seeking to ensure the well-being of humanity now and in the future, plays a fundamental role in this process of re-education.

Thus, it is worth, in this study, identifying some considerations about the State's actions, as a way to raise public awareness about environmental issues, especially through the development of legislation aimed at environmental education and, above all, public policies aimed at teaching members of society to care increasingly about environmental preservation.

## Educational Public Policies

Analyzing etymologically and separately each word of the expression "public policies," it is observed that this expression is composed of words of different origins. The word "politics," of Greek origin, derived from the word *politike*, indicated the art of governing a city ("polis") state. The word "public," however, has a different origin, derived from the Latin word *publicus*, which means concerning the people (Nascentes 1955).

According to Oliveira et al. (2010), public policy, in the etymological sense, refers to the participation of citizens in decisions of the state – of the territory, that is. This can be characterized as the possibility of people influencing decisions of the city.

Historically this participation took on distinct features, in time and space, having happened either directly or indirectly, through representatives. Either way, an agent – the State – has always been crucial in the realization of public policies.

Analyzing the thematic in the social-scientific context, a different view is obtained, even more broadly, because "public policy" is not restricted only to the involvement of people in the decisions of the State, but also in the way that the State acts in response to its people.

For Souza (2003), it is possible to understand succinctly what public policy is as a field of knowledge that simultaneously seeks to put the government in action and/or to analyze this action (independent variable) and, when necessary, propose changes in course and/or understand why and how actions have taken one course instead of another (dependent variable). In other words, the process of creating and manipulating

public policies is one through which governments translate their purposes into programs and actions that will produce desired outcomes or changes in the real world.

As can be noticed, the expression in comment (Sustainable Development) has a broad scope, since it is susceptible of diverse interpretations. It is therefore necessary to restrict the subject or area of actuation, so that it is possible to achieve a deeper, more incisive, and safer approach. Thus, precisely because of the subject's aforementioned breadth, it is important to approach a specific area when it comes to public policies, so that it is possible to analyze the theme safely and appropriately.

The approach to be used involves the educational relationship instituted by the school as a starting point for the analysis of Public Educational Policy, an institution that basically represents the structure of several other subsystems of Education.

Oliveira et al. (2010) made an interesting analysis, describing the concept of Educational Policies. They say that it is necessary to have a specific environment for educational practice, which expresses itself in the institution of the school, which works as a small community, linking different parts of a complex procedure: students, teachers, servants, parents, neighborhood, and state (as a political society that defines the system through public policies). Sauv e (1996) confirms this when she emphasizes, "This is the environment of a human collectivity, a shared living place, a political concern, the focus of critical analysis. It calls for solidarity, democracy and personal and collective involvement in order to participate in the evolution of the community."

Thus, educational public policies, in one of the main definitions, refer to choices and decisions of the government which have an impact on the school environment as a teaching environment. As can be seen, the school-education relationship is extremely important, being constructed from interpersonal and intersocial interactions, involving governmental decisions that reflect directly in diverse sectors of society.

In short, education proves to be a real tool for the creation, implementation, and



instrumentalization of Public Policies, since it is enveloped in an environment prepared and formed by an entire social apparatus focused on “educational doing,” which has a true transforming power and discipline.

In this sense, Sauvé (1996) mentions: “The pedagogical process aims to transform each of us so that we may transform our daily reality: each person must become a creator of, and actor in, his or her own environment.”

### **Public Educational Policies Focused on Recycling of Materials for Sustainable Development**

As seen, there is a historical process that explains material consumption growth as a function of economic growth. Thus, it is necessary to impose an environmental limit so that, with a view to the well-being of present and future generations, excessive and damaging consequences are avoided.

One of the measures for imposing this environmental limit is present in public educational policies. How it was seeing, the education has power to transform and to the awareness the population for proper treatment of garbage produced and, especially, for recycling, aiming, among other measures, the appropriate destination of production and wastes of consumption, as well current and future availability of nonrenewable natural resources.

According to Marchi (2011), one of the international institutions that seeks to establish strategies and public policies to act in the minimization and management of waste is the United Nations Environment Program (UNEP) that has the mission to promote the conservation of the environment and efficient use of resources in the context of sustainable development.

Marchi (2011) also notes that the International Environmental Technology Center (IETC), a division of UNEP, has published a report on the global solid waste scenario that allows countries to self-assess and compare their performance in urban cleaning and which encourages adoption of environmental education practices associated

with solid waste management (United Nations Environment Program 2005, 2015). In a world perspective, Marchi (2011) and UNEP (2015) view a great diversity of actions both in waste management and in effective implementation of environmental education projects that seek to minimize possible impacts generated by inadequate discards.

Thus, it is evident in Africa that municipal power is usually responsible for urban cleaning services. Waste collection is carried out in a variety of ways, from men and carts, to compactor trucks. Solid waste collection on the continent ranges from 20% to 80%, accounting for an average of 40–50% throughout Africa, often unloaded in open air on the ground, without concern for the preparation of the site or aspects (dumps) and in some areas without proper environmental education policies and awareness processes.

In North America, many problems of pollution and waste are caused by continued economic growth and dependence on high levels of energy and natural resources. In recent years, recycling has been more effectively considered in North America due to increased costs of disposal of solid waste, difficulty finding landfill sites or incinerators, diffusion of environmental education programs and policies, and public concern for the environment. In North America, source reduction programs were implemented through education, research, incentives, regulations, and technological development (United Nations Environment Program 2005, 2015).

The United Nations Environment Program (2015) points out that in the largest cities in Australia, Japan, South Korea, and New Zealand, there is a high degree of reduction of solid waste, source separation, and recycling, stimulated by environmental education public policies, new practices, and the collection fees. In other Asian countries, such as India, Vietnam, and China, there is progress in solid waste management, but several problems and difficulties are still found.

In European Union countries, reuse and recycling are part of practices incorporated by citizens and are necessary and essential for

proper performance of integrated management systems. However, there are considerable variations in European practices of reduction at source, recovery of materials, and recycling. These variations occur from methods used, environmental education and awareness programs implemented, public policies focused on sustainable development, degree of political and fiscal commitment, available markets, and equipment used for reception of discarded waste (United Nations Environment Program 2005, 2015).

Some Latin American countries, according to the United Nations Environment Program (2015), are particularly advanced in waste management efforts mainly due to public and educational policies, including Argentina, Brazil, Colombia, and Ecuador. In this way, it should be stressed that although there is still a need for real commitment, Brazil has made great strides in this direction. On August 31, 1981, Law No. 6,938 was published, which regulates the national environmental policy and regulates the administrative structure of protection and environmental planning (Antunes 2005).

This legal diploma provided a real milestone in Brazilian legislation, given that in its own text the influence of the movement caused by sustainable development could already be noticed. Article 4, item I, provides that the compatibility of economic and social development, with preservation of the environment quality and ecological balance, will be one of the main objectives of this policy.

It should also be noted that on August 2, 2010, Law No. 12,305 was published, which established the National Policy on Solid Waste (Brasil 2010). In this legal document, there is a clear emphasis on standardization of waste disposal processes, including nongeneration, reduction, reuse, recycling, and treatment of solid wastes, as well as environmental disposal of wastes.

The expressiveness of the subject in question is clear, since its repercussions extend to several areas of society and are also the target of several types of public policies instituted by the State.

As well known, recycling is the use of garbage, making it useful again. Such a tool demonstrates potential to boost true sustainable development,

since it avoids environmental costs from material extraction from nature as well as eliminates the need to remove debris and waste from the production and consumption process.

In addition, according to Montibeller-Filho (2008), recycling is seen as the future in solving the ecological crisis of waste disposal, having a prominent place in public educational policies.

This is because, notoriously, the school space, in the wake of “educational doing,” is the great modeler of customs and ideologies of our society. This is because in this microsystem, present in almost all communities, there is concern to “be more,” that is, to seek the best and the improvement of human beings (Oliveira et al. 2010).

Thus, in order to take advantage of the transforming potential of education, Law No. 9,795 was published on April 27, 1999, providing for environmental education and instituting the National Environmental Education Policy (Brasil 1999).

The article 10 states that environmental education will be developed as an integrated, continuous, and permanent educational practice at all levels and modalities of formal education in order to highlight the importance of environmental education for the future of society. In addition, its article 4, as one of its principles, highlights the conception of the environment in its totality, considering the interdependence between the natural environment and socioeconomic and cultural aspects, under the focus of sustainability.

### **Obstacle to the Materialization of the Public Policies Focused on Recycling of Materials for Sustainable Development**

While Sneddon et al. (2006) have optimistically pointed that since Brundtland Report, the world is a very different place, partly by account of the report repercussion itself, but also largely because of changes that were difficult to perceive when the report was prepared, on the other hand, according to Hopwood et al. (2005), it is possible to note the growth of various problems in the environment and/or society.

He argues that such problems are rooted in basic and fundamental characteristics of today’s

society, especially in how humans interrelate and how they relate to the environment. For him, a transformation in the social environment and/or human relations with the environment is necessary, so that a growing crisis and even a possible future collapse could be avoided.

Notoriously, difficulties are faced on a daily basis so that principles established in legislation can be applied, or even understood by society. This is due to several reasons; however, it is necessary to highlight, among the different causes, the problem of world's population's culture referring to the whole question of produced garbage destination as well as question of the need of environmental preservation and care for the environment as a whole.

Evidently, nowadays it is still possible to identify an international cultural tendency to the excessive consumption, that is, unconcerned with the future. This variable, in particular, ends up generating a damaging collective consequence because of individual actions contaminated by disregard for the next and even for the next generations.

In addition to this issue, we also highlight the problem of the national population culture, regarding the disposal of waste produced. This is highlighted, both with regard to household waste and to what is analyzed in relation to the garbage produced on a daily basis, on the street, at work, in leisure time. This is what happens in addition to garbage produced due to the disposal of durable goods, replaced more and more frequently, in face of industry advance, technology, and modism to always substitute owned goods by newest and most modern ones to detriment of conservation.

As long as there is unconcern about the issue of unnecessary and excessive consumption and the importance of conscious disposal (and the need to reuse and recycle what is discarded on a daily basis), there is a serious risk of more immeasurable and irreversible damage to environmental conditions.

Therefore, the creation and encouragement of Public Educational Policies is valid because, as seen in the course of this work, such measures have the capacity to change and stimulate the

human being, who, individually, has responsibility for the whole community.

Of course, individual actions, summed up in the same direction, represent the whole movement of the collectivity, which must be directed towards the sustainability of relations, not only for human relations to be maintained, but also for the human species to perpetuate in balance with the very environment in which it lives.

In other words, it can be said that with education, there is certainly much more chance of fostering a change in national culture, in order to promote improvements in environmental aspects.

## Conclusion

In sum, the present work has sought to elucidate and explain the importance of government action, through public educational policies, to give effect to proposals set out in its own legislation, aimed at protecting the environment and realizing its potential for the achievement of sustainable development.

As seen, it is an expressive movement that needs a real commitment so that what is laid down in law has an effect in the real world. Although many countries all over the world, including Brazil, have been developing legislation aimed at improving the idea of, and the search for, sustainable development, there are cultural and educational problems that prevent the realization of this substantial potential.

In other words, although there exists a genuine effort to give effect to the proposals theorized about sustainable development around the world, some problems are apparent which make it difficult to achieve that objective. Many such problems doubtless arise from the issues with interpretation of the term itself; but most of all they arise from the general lack of concern with the environment, which is culturally rooted. As seen above, the cultural problem, between others points of view, is directly related to the education of the population in general, and so the resolution of all the problems in question must start with improvements in education, as well as through public education policies.

As is well known, although in general legislation provides an incentive for environmental education, a large part of world society is not aware of, or chooses to ignore, the impact of personal actions, however minimal, on the environment.

Individual, as well as state, action is necessary, action by each individual that is part of that society, collaborating either with conscious consumption, selective collection, or in any way participating and encouraging the recycling processes organized by the state. Therefore, the essence of environmental educational public policy, that is, its main purpose, is to educate the population, prepare current and future generations, and create programs to encourage culture for the continuity and well-being of the human being (Sorrentino et al. 2005).

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