

Sustainable Development and Sustainable Science. Where We Came From, Where We Are Now and Where We Are Heading? Part I: The History of the Concept

Zrównoważony rozwój i nauka o zrównoważoności. Skąd pochodzimy, gdzie jesteśmy teraz i dokąd zmierzamy? Część I: Historia koncepcji

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Abstract

This work focuses on the origin, the history and milestones that led to the conceptualization of sustainable development (SD). Not only is the concept of SD broad, but it is often used interchangeably with the more general (but sometimes also more specific) concept of sustainability. The concept of SD is analysed based on its development and relationships with sustainability and related scientific (theoretical) and practical concepts. The rationale behind this work lies in clarifying the meaning of SD, including the concept of sustainability, and, on the basis of this, identifying the main ways of moving closer towards the aims of SD, including quality of life and wellbeing. The limitations of the concept are identified and summarized, as are the alternatives to SD and sustainability. The rationale behind this work lies not only in the clarifying of the SD concept, but also in the normative evaluation of this concept in relation to the wellbeing and quality of life of the Earth's population for an infinite time period, while maintaining the supply of ecosystem services which the planet provides, taking into account that these resources are not only a source of people's wellbeing, but are essential for people's survival in general. Hence this work includes an in-depth sophisticated consideration of the SD concept based on its historical development, with a focus on the most crucial milestones, as well as normative assessments of the concept resulting from this knowledge.

Key words: development, history, progress, quality of life, sustainable development, sustainability, wellbeing

JEL Classification: I10, I13, I15, I18, Q01

Słowa kluczowe: rozwój, historia, postęp, jakość życia, zrównoważony rozwój, zrównoważoność, dobrostan

1. Introduction

Sustainability is a nebulous but attractive concept which poses an essential question for every activity – whether it can continue. Not only is the concept of sustainability broad, but it is also often used interchangeably with the concept of sustainable development (SD), with which it is significantly interconnected. However, they are not the same. If an activity is sustainable, in practice it can continue forever, which is in compliance with a general definition of sustainability in relation to the SD concept.

The human species is fundamentally dependent on the flow of ecosystem services which are used in production and consumption in order to increase their wellbeing and quality of life. Hence it is necessary to identify these services in order to determine the relationships between the three distinct pillars of SD, wellbeing and quality of life. Different definitions of ecosystem services according to different scholars have been introduced. La Notte et al. (2017) addressed the challenges identified in ecosystem services research, and a survey and detailed analysis of definitions is provided in their work. For the purpose of this paper, only a few of them are provided to clarify and emphasise the essence, importance and relationships of these services to the concept of SD/sustainability and

the survival of humanity in its current form. Some definitions are very similar, such as those claiming that ecosystem services are defined as the direct and indirect contributions of ecosystem structures and functions (Müller and Burkhard, 2012); the direct and indirect contributions of ecosystems to human wellbeing (Maes et al., 2016; TEEB, 2009); the benefits that people obtain from ecosystems (the outcomes sought through ecosystem management) (Wallace, 2007); the flow of services (outcome of structure and processes) provided by ecological assets in a certain assessment period (Bateman et al., 2011); the use of ecological assets over a certain time period (Boyd and Banzhaf, 2007). The Millennium Ecosystem Assessment (MA, carried out in 2001-2005; MA, 2005) assessed the consequences of ecosystem change for human wellbeing and established the scientific basis for actions needed to enhance the conservation and sustainable use of ecosystems and their contributions to human wellbeing. It focuses on the linkages between ecosystems and human wellbeing and, in particular, on *ecosystem services*.

Ecosystem services are the benefits people obtain from ecosystems (this is in compliance with several definitions used above, especially that of Wallace, 2007). These include *provisioning services*, including food, (fresh) water, timber and fuel; *regulating services*, including climate regulation, flood regulation, disease regulation and water purification; cultural services, which provide educational, recreational, aesthetic and spiritual benefits; and *supporting services*, including primary production, soil formation, photosynthesis and nutrient cycling. In this work, the term ecosystem services is generally used to refer to some kinds of natural re/sources or sinks. What is usually meant when speaking about sources and sinks, or more generally about resources (unless explained otherwise), is provisioning, regulating and supporting services, or a combination of these.

To start broadly, in any situation of scarcity of resources generally representing environmental services, including (among others) means of production and sinks, choices are to be made. Either decrease in demand or increase in supply needs to be pursued. As regards supply increases, they can be achieved by military or by economic means, and by international free trade, or by increasing efficiency and substitution processes in the domestic market. The choices result in four strategies that are theoretically feasible and have been pursued in practice throughout history and different places, in isolation or, more frequently, in combination (Spangenberg, 2008). Based on an analysis of the history of the concepts of SD and sustainability, these approaches are further analysed in subsection 3.3. The crisis, which has several dimensions, namely social, economic, environmental and political, along with its associated cultural, spiritual and intellectual aspects, has its institutional origins in the emergence of the capitalist economy from the Scientific and Industrial Revolutions in England (see e.g. Merchant, 1980; Capra, 1983). The shift in attitudes towards nature shaped by the ideology of the Enlightenment was key in changing the view of the world, leading to a disillusionment about nature and a reduction of its power over physical and spiritual aspects of human life. (Eckersley, 1992; Merchant, 1980).

The SD paradigm emerged to provide a framework by which economic growth, social welfare, and environmental protection can be harmonized (Asara et al., 2015). Although such harmonization has proved elusive until very recently, it has been accepted in different areas of human activity. The concept of SD has experienced various developmental phases and the participation of a variety of institutions since its introduction, and has undergone different interpretations and critiques over time. In its development, the concept has been adapting to the requirements of a complex global environment, but the underlying principles and goals, as well as the problems of their implementation, remained almost unchanged (Klarin, 2018). However, policy goals have been updated, having responded to actual challenges. Generally, sustainability, a nebulous but attractive concept, poses an essential question for all human activities – i.e., that of whether they can continue. This means that activities such as production, consumption, and related uses of natural, physical, human or other forms of capital which can be carried out indefinitely can be regarded as sustainable. Hence, this concept is broader and more general than the concept of SD. An important challenge related to both concepts is to maintain the sources of people's wellbeing, but it's even more important to find ways of ensuring that this is compatible with environmental limits, while ensuring that a high level of social welfare and inclusion is achieved, and social imbalances are minimized.

This work focused on the origin, the history and milestones that led to the conceptualization of SD. It is crucial to study the notions of progress, growth and their mutual interrelations in order to discover a deeper meaning in this concept. The main aim of the work is to clarify the essence and deeper significance of SD based on an analysis of the history of the concept, key scientific works and practical policies, strategies, and actions. Putting the concept into operation is crucial – it should be aimed at sustaining or increasing wellbeing and quality of life within ecological limits. Analysis and synthesis of the relevant knowledge are used as the basic methods, and a normative approach and critical evaluation are applied to derive conclusions and recommendations. Concrete strategies, concepts and instruments are also analysed from the normative perspective when relevant to the aim of the paper.

In the introduction, the most famous and most quoted definition must be outlined to be able to analyse the meaning of the SD concept in detail. According to WCED (1987), *sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It contains within it two key concepts: (1) the concept of needs, in particular the essential needs of the world's poor, to which overriding priority should be given; and (2) the idea of limitations imposed by the state of technology and social organization on the environment's ability to meet present and future needs*. Behind this general description many aspects are hidden and they will be detected, analysed and critically evaluated in the following sections. In this

place is necessary to emphasise that in compliance with this definition the notion of SD is composed of two crucial elements, i.e. meeting human needs and respecting the limits imposed by the environment (WCED, 1987). SD as originally conceived in this definition is still a convincing concept.

Primarily, the rationale behind this study lies in a consideration of the concept of SD (and related concepts) and its adoption as a basic philosophy. Mainstream neoclassical environmental (EN) economics is considered as the basic scientific (theoretical) approach for dealing with environmental issues in economics. Other crucial approaches in economics, including alternative approaches, are also considered. These are understood to be the theoretical foundations for practical applications or for more practical concepts. Fourteen economic systems were studied by Beeks (2016). They include environmental (EN), circular (CR), green, resilience (RE), ecological (EC), complexity (CY), feminist (FE), compassionate (CT), caring (CG), degrowth (DH), steady-state (SE), no-growth (NH), ecosocialism (EM), and anarcho-ecosocialism systems (AEM). The formation of these systems by the author is related to the misunderstanding that a sustainable society can be based on an economy with economic growth which also has significant effects on ecosystem services. Nevertheless, the approach in this work is different to some extent. Not all of these concepts can be understood as alternatives to sustainability and SD (especially the first four: EN, CR, GN, and RE), although they can be understood as alternatives to capitalism from several perspectives. Additionally, the EN and EC economics can be understood more as the theoretical foundations to the practical concepts that focus on the relationships and balance between the economic, social, and environmental dimensions of economies. EC economics also provides an alternative to the neoclassical EN economics. Based on this approach, the concepts of sustainability and SD are considered as basic concepts, the concepts of green economy (GE) and green growth (GG) are regarded as more practical concepts, which also operationalize the concepts of sustainability and SD. As regards alternative approaches, the concepts of NH, SE, and DH economies, and a number of even more practical alternatives to the concept of degrowth, reflecting the cultural features of smaller communities, are considered in this work. The remaining concepts in the list (CY, FE, CE, CG, EM, and AEM) can be understood as more comprehensive concepts, which significantly support quality of life and wellbeing. Moreover, some of these concepts are significantly interrelated.

This paper has been divided into the following parts: Introduction (section 1); Analysis of the history concept of sustainable development and related concepts (section 2); Conclusions (section 3).

2. Analysis of the history concept of sustainable development and related concepts

The important works dealing with the history of the SD concept include Spangenberg (2008), Grober and Cunningham (2012) or Du Pisani (2006). To understand the concept of SD, it is necessary to study the historic aspects of progress, growth, and development (more in Drastichová, 2018), as well as the milestones of the development of the SD concept, the more general concept of sustainability, and both their scientific basis as well as their integration into policies and strategies. Subsequently, it is necessary to study the more practical counterparts of these concepts as well as the alternative concepts which have developed not only as a criticism of the concept of SD and sustainability, but also of the whole prevailing socio-economic models and systems, especially that of capitalist. For a deeper understanding of the content of the concept of SD, the differences between SD and sustainability need to be analysed in more detail, specifying their supplementary concepts, including the human development approach (UNDP, 2022). The related theoretical and practical concepts and alternative concepts, particularly that of degrowth, need to be analysed as well (see more in Beeks, 2016).

In this section several crucial milestones, including their evaluation, are presented. The terms *sustainability* and *sustainable* appeared for the first time in the *Oxford English Dictionary* in the second half of the 20th century, but the equivalent terms in French (*durabilité* and *durable*), German (*Nachhaltigkeit*, literally meaning *lastingness*, and *nachhaltig*) and Dutch (*duurzaamheid* and *duurzaam*) have been used for centuries (Van Zon, 2002). The concepts of sustainability and SD have had a very long history in science as well as in policies. However, neither of them has been limited by one specific discipline (Spangenberg, 2008). Economic scarcities, social tensions and overexploitation of ecosystem services, i.e. sources and sinks, have accompanied human civilisations since the Stone Age. Scarcity of resource supply first became obvious in the most developed countries during the late 17th century, when pre-modern industrial production caused a shortage and a continuous price increase of wood. As early as 1713 Hans Carl von Carlowitz (head of the Royal Mining Office in the Kingdom of Saxony) referred to *sustainable yield* in the context of sustainable forestry management. He formulated ideas for the sustainable use of forest, and he is considered one of the founders of the concept of sustainability (von Carlowitz, 1713; Grober, 2007). Although the origin of the concept of sustainability can be traced back to even earlier times, there had never been more rapid growth in production, consumption and wealth in the world's history than after the Industrial Revolution. Particularly, the population and consumption growth after the Industrial Revolution, and the threat of the crucial resources depletion, such as wood, coal and oil, encouraged the awareness that the sustainable resource use is inevitable (Du Pisani, 2006). Van Zon (2002) indicated that the demand for raw materials and its impact on the environment have been a constant issue throughout human history (see more in Drastichová, 2018).

2.1 The earlier development of the SD concept

Starting with a historical overview, it should be emphasised that it was the process of domination of the Northern developed countries, carried out through colonisation in pursuit of ecosystem services (resources, including land) and markets, and subsequently continuing with the globalisation of trade, technological knowledge, the money market and communications (The Ecologist, 1993), which eventually resulted in global impacts on natural and human systems. Vitousek (1994) argued that any clear difference between original ecosystems and human-altered areas that may have existed in the past had vanished. Currently, the Earth has crossed the boundary regarding environmental problems and their associated social impacts. Moreover, the sharing of the impacts is not equitable; the poor disproportionately bear the consequences of environmental degradation (e.g. Agyeman et al. 2003; Martinez-Alier, 2003). These environmental and social impacts and the effort to tackle them led to the forming of the concept of SD on the international agenda in the 1970s (Carley and Christie, 1992).

During the period of industrial and commercial expansion after World War II, there was also the rising public awareness of the rapid population growth, resource depletion and pollution, threatening the survival of humans. Environmental concern became more radical because of the fear that economic growth might endanger the survival of the humankind and the planet. During the 1960s, it had been optimistically assumed that the development problems of the less developed part of the world would be solved quickly as a result of world-wide economic growth. Since the late 1960s, there has been a large amount of scientific literature on the issues related to sustainability and SD, including alarming scientific information about the damage caused to the natural environment by human activities has been published in a number of books and articles. The crucial representative books in relation to the evolution of the SD concept included those of Carson (1962), Ehrlich (1968), (Meadows et al., 1972), Goldsmith (1972), Schumacher (1973) and crucial research articles included those Hardin (1968), or Molina and Rowland (1974) (among others).

The fight against the power of globalisation and market capitalism was initiated with Rachel Carson's work revealing practices in chemicals industry while shattering the assumption that the environment had an infinite capacity to absorb pollutants (Carson, 1962). Ehrlich (1968) predicted a demographic disaster in response to eventual food shortages and disease since the rate of population growth was surpassing agricultural growth and the capacity for renewal of Earth's resources. A crucial publication related to the development of the SD concept, commissioned by the Club of Rome, was prepared by a group of renowned economists and scientists and entitled *The Limits to Growth* (Meadows et al., 1972). Five basic factors were identified and investigated in the original model as factors determining and limiting growth. It was assumed that exponential growth accurately described their patterns of increase. These variables included: world population, agricultural/food production, natural resources (resource depletion), industrial production (industrialization), and pollution. The key message of the book is that unchecked consumption and economic growth on the finite planet leads the Earth towards *overshoot* of its carrying capacity, followed by disaster. The most crucial conclusions were that if the growth trends in world population, industrialization, pollution, food production, and resource depletion continue unchanged, the limits to growth on this planet will be reached sometime within the following one hundred years. It is possible to alter these growth trends and to establish a condition of ecological and economic stability that is sustainable far into the future. The Club also hoped to shock people, to provide warnings of potential world crisis if current trends are allowed to continue, and thus provide an opportunity to make changes in political, economic and social systems (Meadows et al., 1972). One of the motives behind the Club's project was the belief that scientists and politicians had become willing to believe that the solution can be found when things go too far. The Club also hoped to shock people, to provide warnings of potential world crisis if current trends are allowed to continue, and thus provide an opportunity to make changes in political, economic and social systems (Meadows et al., 1972). The purpose of publishing the book was to open the debate on accelerating global trends to a wider community. The intention of the research was not to make specific predictions, but to explore how exponential growth interacts with almost finite resources. This report forms the basis for the concept of sustainable production and consumption (SCP) (and also for both of these concepts if analysed separately) and for the concept of degrowth.

The publication of Goldsmith (1972) named *A Blueprint for Survival* was influenced by *The Limits to Growth* (Meadows et al., 1972) and emphasised the need to conserve and preserve environmental resources. It indicated that if current trends are allowed to persist, the breakdown of society and the irreversible disruption of the life-support systems on the planet, possibly by the end of the century, are inevitable. It required a stable society that could be sustained indefinitely while providing optimum satisfaction to its members Schumacher (1973) examined the modern economic system, its use of resources and how it affects people's lives and whether the system reflects what society cares about. He also dealt with the theme of non-growth, criticised the waste and overexploitation of resources and the over-reliance on capital and energy intensive technology. He argues that it is necessary to give up the belief that technology can solve all of people's problems. Hardin (1968) presented that a finite world can support only a finite population. An important conclusion also was that that free access and unrestricted demand for a finite resource ultimately reduces the resource through over-exploitation. Molina and Rowland (1974) showed that chlorofluorocarbons (CFCs) could destroy ozone. The depletion of the ozone layer subsequently be-

came one of the global environmental problems also indicating a deepening of unsustainable trends and unsustainable development. Among the authors mentioned above there were biologists (R. Carson, P. Ehrlich, G. Hardin), chemists (M. Molina, F. S. Rowland), economists (E. R. D. Goldsmith (also environmentalist and philosopher), E. F. Schumacher), Accordingly, the multidimensionality and multidisciplinary of this research area could have been predicted.

By the 1970s, the existing notions of progress, growth and development were being challenged and in the 1970s, this optimism weakened. Economic growth did not prove to be the desired solution to global problems and inequalities. This realization required a paradigm shift to a notion of development. Formerly, development and conservation had been regarded as conflicting ideas, i.e. conservation as the protection of resources, and development as the exploitation of resources (Paxton, 1993). Then the concept of SD appeared as a compromise between the concepts of development and conservation, which became understood as interdependent issues. The term sustainability used in ecology to refer to a state or condition that can be maintained over an indefinite period, was introduced on a more regular basis into development discourses (Du Pisani, 2006). The first oil crisis (1973) had demonstrated the potential consequences of resource shortages. As a result of that the expectations of unlimited economic growth weakened when a worldwide recession occurred in the mid-seventies (1974-1976). Following the considerations about the causes of the recession, an awareness of the limits to economic growth arose (also following the publication of Meadows et al. (1972) mentioned above).

It can be summarized that during the 1960s and 1970s a global understanding of sustainability challenges developed with the emerging environmental movement that highlighted several environmental problems. The conceptual basis for the current use of the term *sustainable development* were consolidated in the early 1970s. At the beginning of the 1970s, this term was probably conceived by the founder of the International Institute for Environment and Development (IIED), Barbara Ward (Lady Jackson) (Ward and Dubos, 1973). Coomer (1979) pointed out that the sustainable society was one that lived within the self-perpetuating limits of its environment, but that it was not a no-growth society. Rather, it was a society that recognized the limits to growth and sought for alternative ways of growth.

The 1972 United Nations Conference on the Human Environment (UNCHE) was a first taking stock of the global human impact on the environment, an attempt at forging a basic common outlook on how to address the challenge of preserving and enhancing the human environment (Handl, 2012) and the conflicts between environment and development were first acknowledged (Kates et al., 2005). Since the 1980's, sustainability has emerged as a principle in opposition to unlimited growth (Gowdy, 1994). In the 1980s, environmental degradation and unsustainable use of natural resources was widely recognized internationally among political leaders. This resulted in new international policies and action plans regarding the sustainable use of forests, water, and seas, and the addition of development to the sustainability concept. As a consequence, the focus shifted from the state of ecosystems to the steering of society (Baker, 2006). In the 1980s, the new paradigm of SD became popular and more widely used. Allen (1980) defined SD as a development that is likely to achieve lasting satisfaction of human needs and improvement of the quality of human life. The term was also used in the International Union for the Conservation of Nature's (IUCN) World Conservation Strategy (IUCN, 1980), which argued that for development to be sustainable, it should support conservation rather than hinder it. Among the prerequisites for SD is the conservation of living resources, which are essential for human survival and SD, while they are increasingly being destroyed or depleted. The aim of this strategy was to help advance the achievement of SD through the conservation of living resources. This strategy among others explains the contribution of living resource conservation to human survival and to SD. It presents that conservation improves the prospects of SD and proposes ways of integrating conservation into the development process.

2.2 The development of the SD concept (crucial milestones) in 1980s and 1990s

It can be seen that at the beginning of 1980s great importance in relation to SD was placed on ecosystem services and the conservation of living species, especially in the conception of the IUCN (IUCN, 1980). Its World Conservation Strategy of 1980 is the first international document on living resource conservation produced with inputs from governments, non-governmental organizations, and other experts. Some critique must be mentioned in relation to this report and its definition. Its declaration of domination over nature, and, by implication, humankind, was unpopular, as was the stance on *scarcity* as opposed to *redistribution* (Redclift, 1992; Achterhuis, 1993). The strategy was still environment-dominated with prevalent Malthusian connotation, and it failed to examine the social and political changes which would be necessary to meet its conservation goals (Redclift, 1994).

Although these aspects have gained importance and are now even more crucial, the definition of SD and the SD concept in general have shifted into a more universal meaning. The General Assembly of the United Nations (UN), in its resolution 38/161 of 19 December 1983 welcomed the establishment of the World Commission on Environment and Development (WCED). When the WCED sought to define SD, it drew from Barbara Ward's landmark book (Ward and Dubos, 1973). The WCED submitted a report entitled *Our Common Future*, informally known as the Brundtland Report, to the UN in 1987 (WCED, 1987). In Chapter 2 of the WCED report, SD is defined as follows: *Sustainable development is development that meets the needs of the present without compromising the*

ability of future generations to meet their own needs. This report represents a blueprint for the worldwide attention being paid to the concept of SD. Sustainability was agreed on as an aim for the use of natural capital, and SD as the principle for further development (WCED 1987; United Nations, 1992).

Another milestone in 1980's was an adoption of crucial international agreements to combat the depletion of the ozone layer. The IUCN subsequently defined it again in its following report (IUCN et al., 1991) as the capacity to maintain a certain process or state for improving the quality of human life, while living within the carrying capacity of supporting ecosystems. In this report important aspects related to are analysed. Caring for the Earth uses the word *sustainable* in several combinations, including *sustainable development*, *sustainable economy*, *sustainable society*, and *sustainable use*.

The more general WCED report (WCED, 1987) had crucial importance for the development of SD strategies and policies at the UN, or more generally at the international level, and subsequently national and lower levels, and up to the individual level. After taking the 1987 WCED report into consideration, the General Assembly of the UN called for the UN Conference on Environment and Development (UNCED) (also known as the Earth Summit, which took place in Rio de Janeiro, 3-14 June 1992). The primary goals of this summit were to come to an understanding of development that would support socio-economic development and prevent the continued deterioration of the environment, and to lay a foundation for a global partnership between developing- and more industrialized countries (United Nations, 1997). The central focus was how to relieve the global environmental system through the introduction of the SD paradigm. One of the major results of the UNCED was Agenda 21, a comprehensive plan of action calling for new strategies to invest in the future to achieve overall SD in the 21st century. The UN Framework Convention on Climate Change (UNFCCC) and the UN Convention on Biological Diversity (UNCBD) represent other crucial milestones related to the SD policies. However, in 1998, it was noted by the former Secretary-General of the Rio Summit (Maurice Strong) that despite recognition of and commitment to the principles of SD, action has not moved beyond the margins and has not led to the core changes needed to support a transition to SD (Drexhage and Murphy, 2010).

2.3 The development of the SD concept (crucial milestones) in 2000s

In the 2000's there were several core milestones related to SD, which should be mentioned. The Millennium Declaration, the document unanimously adopted by the United Nations General Assembly (at the UN Millennium Summit in September 2000), contained a statement of the values, principles and objectives of the international agenda for the 21st century. The world leaders, who gathered at the Summit, committed their nations to a new global partnership to reduce extreme poverty in its many dimensions, and set out a series of time-bound targets, with a deadline of 2015 that have become known, since the Millennium Summit, as the Millennium Development Goals (MDGs). In the field of environmental protection, the Millennium Declaration stated that no efforts must be spared to set back the threat to the planet being irreversibly affected by human activities. Therefore, it was decided to adopt a new ethic of conservation and stewardship (United Nations, 2022).

The most recent summits convened by the UN must be mentioned due to their great importance in relation to SD. The World Summit on Sustainable Development (WSSD, held in Johannesburg, South Africa, 26 August – 4 September 2002) and brought together tens of thousands of participants and the impulse for this Summit was also a sense of disappointment over the failure of governments to implement the resolutions of the 1992 UNCED and take appropriate action to deal with environmental problems. Five themes of particular attention at the Summit were identified by the Secretary-General Kofi Annan. They included water, energy, health, agriculture and biodiversity. These issues, together with population and poverty, and the relationships among them, were assessed in the Report published before the Summit (United Nations, 2002a). The outcome documents more explicitly acknowledged the links between poverty alleviation and environmental protection than the outcome documents of the 1992 UNCED (Azmanova and Pallemmaerts, 2006). This Summit was referred to as a significant failure. Governments awarded transnational corporations a central role in the implementation of SD. The negotiated final documents (*Type I Outcomes*) (United Nations, 2002b) have been criticized as being too vague and for setting weaker goals than those agreed upon in previous summits. Thus, new voluntary partnership initiatives (*Type II Outcomes*), by and between governments, NGOs and businesses, were intended to promote the implementation of the government-negotiated final documents. Critics also argued that the Summit has put poverty eradication in the forefront while advancing economic growth as the main strategy for poverty eradication. This would result in the usual recipes for economic growth (such as market liberalisation, direct foreign investment as a major funding mechanism, public-private partnerships, or good national governance to safeguard property rights) being redefined as SD strategies, but with few – if any – counterbalancing environmental and social rules and regulations, or redistributive mechanisms.

The UN Conference on Sustainable Development in 2012 (UNCSD, Rio+20, Rio de Janeiro, Brazil, 20 – 22 June 2012) aimed at securing renewed political commitment for SD (Stoddart et al., 201; United Nations, 2022a). The official discussions of UNCSD focused on two main themes, i.e. how to build a GE to achieve SD and lift people out of poverty; and how to improve international coordination for SD. The identification of the GE as one of the key themes for the Rio+20 represents an opportunity to define a new global economic paradigm (however, the

term *greening the economy* has been a re-emerging issue of the policy debates since the early 1970s.). Nevertheless, there was also a risk that previously hard-won global agreements on SD might be lost in the pursuit of the new agenda. Innovative guidelines on GE policies were also adopted. Concerning the institutional aspects, governments agreed to strengthen the United Nations Environment Programme (UNEP) in several areas. They also agreed to establish a high-level political forum for SD. It was also decided to establish an intergovernmental process under the General Assembly to prepare options on a strategy for SD financing. Forward-looking decisions were also adopted on a number of thematic areas, including decent jobs, energy, sustainable cities, food security and sustainable agriculture, water, oceans and disaster readiness (The International Institute for Sustainable Development IISD, 2022).

Governments also adopted the ten-year framework of programmes on sustainable consumption and production patterns (contained in document A/CONF.216/5: United Nations, 2012). In the area of the methodology and measurement of SD, governments also requested that the United Nations Statistical Commission initiate a work programme in the area of measures of progress to complement GDP indicators in order to better inform policy decisions. As part of the post 2015 development agenda, member states also decided to start the process of developing a set of Sustainable Development Goals (SDGs), based on the Millennium Development Goals (MDGs). This represents a crucial step towards a more integrated global SD agenda (UN General Assembly, 2012)

The adopted final political outcome document of UNCSD, named *The future we want* (United Nations, 2012; UN General Assembly, 2012), contained practical measures for implementing SD. It emphasized that poverty eradication, changing unsustainable and promoting sustainable patterns of consumption and production and protecting and managing the natural resource base of economic and social development are the overarching objectives of and essential requirements for SD. The need was reaffirmed to achieve SD by promoting sustained, inclusive and equitable economic growth, creating greater opportunities for all, reducing inequalities, raising basic standards of living, fostering equitable social development and inclusion, and promoting the integrated and sustainable management of natural resources and ecosystems that supports, inter alia, economic, social and human development, while facilitating ecosystem conservation, regeneration and restoration, and resilience in the face of new and emerging challenges (UN General Assembly, 2012). It must also be emphasised that in this outcome document of UNCSD, named *The future we want* (UN, 2012), economic growth is advocated in more than 20 articles. Article 4 is important for this philosophy, since it states that the need to achieve SD *by promoting sustained, inclusive and equitable economic growth...*, is reaffirmed. This approach is based on neoclassical environmental economics, supporting the concept of decoupling economic growth from environmental harm through dematerialization and depollution. This leads to improvements in eco-efficiency. In this conceptual framework, market prices can serve as the appropriate means for tackling environmental issues, internalizing externalities. Exogenous technological progress can counterbalance the effects of resource depletion. Similar aspects were already outlined in WCED (1987), presented and put into operation at UNCED (1992). The WSSD went even further, advancing economic growth as the main strategy for poverty eradication. All these milestones reflect the concept of weak sustainability (analysed in subsection 3.2) and other weak versions of several related concepts. This does not seem to provide adequate strategies, with the WSSD, in particular, regarded as a significant failure. One of the crucial results of the UNCED (1992) was the requirement to change consumption and production patterns, which the developed countries should have pioneered. In contrast, at the 2012 UNCSD, the GE was the theme pursued by the OECD, the EU and some other countries. This development could be understood as an attempt to put SD into practice in the form of the GE in order to meet the goals of the 1992 UNCED. On the other hand, it could also be understood as a diversion from what should have been achieved (see also Lorek and Spangenberg, 2014).

More particularly, in relation to the financial crisis of 2008 and the associated economic crisis, there has been a revival of interest in the application of the concepts of the GE and GG (first appearing in 1989) by inter/national authorities, and both concepts have started being widely applied (explained in subsection 3.1).

The most recent and the most comprehensive global political effort towards achieving SD is the post-2015 development agenda – the UN Agenda 2030, including the set of Sustainable Development Goals (SDGs), formulated by the UN in 2015 as a comprehensive global policy framework for addressing the most crucial economic, social and environmental challenges for humanity (UN General Assembly, 2015). The SDGs represent a comprehensive framework to promote synergies and manage trade-offs across sectoral policies in an integrated manner, to engage all actors in the policymaking process (OECD, 2020). The SDGs are *context specific*. To achieve the goals, it is necessary to consider the social, political and environmental circumstances of particular locations (Oliveira et al., 2019; Weitz et al., 2018). The agenda and the SDGs reflect the previous experience with the MDGs (applied during 2000-2015). While the MDGs focused on improving wellbeing in the developing world, the 17 SDGs address all countries and aim at reconciling economic and social with environmental goals (Eisenmenger et al., 2020). Achieving this agenda, including all the SDGs, would require a comprehensive, holistic and transformative approach, combining different means of implementation and integrating the economic, social and environmental dimensions of SD. The UN Agenda 2030 should have been designed in such a way so as not to repeat the insufficiencies of the previous programmes, such as lack of action and practical orientation, not creating a win-win strategy, etc. It is still not obvious to what extent these aims have been or will be met. To summarize the relationships between

the SDGs and the MDGs, the first set is built on the second. The SDGs can be broadly divided into three categories. First group is an extension of MDGs and it includes the first seven SDGs. The second group can be referred to as inclusiveness. It includes jobs, infrastructure, industrialization, and distribution. Goals 8, 9, and 10 are involved in this group. The third group covers the last seven goals: sustainable cities and communities, responsible consumption and production, life on land and below water, climate action, peace and justice and the means of implementation, and global partnership for it (Kumar et al., 2016)

The MDGs included specific targets and milestones in eliminating extreme poverty and therefore were narrower in scope and more specific, especially focusing on the social pillar of SD. In the group of the eight goals only MDG 7: *ensure environmental sustainability* includes the crucial targets in the environmental pillar of SD, including those of other key political strategies at the international level, while the target of *halving the proportion of people without sustainable access to safe drinking water and basic sanitation* is also included in this goal. It can be concluded that the key environmental pillar is quite compressed in one (the seventh) goal. The same, and to an even greater extent, applies to the economic pillar of SD. In this goal the aspects of the economic pillar of SD are compressed, but the targets are even limited to those which can reduce some burdens and obstacles which are faced by the developing countries, including the least developed countries. The SDGs expanded its scope to 17 goals from the eight (8) goals in the MDGs, which covers universal goals on fighting inequalities, increasing economic growth, providing decent jobs, sustainable cities and human settlements, industrialization, tackling ecosystems, oceans, climate change, sustainable consumption and production as well as building peace and strengthening justice and institutions. Unlike the MDGs, which only targets the developing countries, the SDGs apply to all countries, both the developed and developing ones. The SDGs are also nationally-owned and country-led, wherein each country is given the freedom to establish a national framework in achieving the SDGs (see e.g. PSA (2022)). Both the MDGs and the SDGs are summarized in Table 1.

Table 1 Comparison of the MDGs and the SDGs set, source: Kumar et al. (2016)

MDGs	SDGs	
GOAL 1: Eradicate extreme poverty and hunger	GOAL 1: No Poverty	GOAL 9: Industry, Innovation and Infrastructure GOAL 10: Reduced Inequality
GOAL 2: Achieve universal primary education	GOAL 2: Zero Hunger	GOAL 11: Sustainable Cities and Communities
GOAL 3: Promote gender equality and empower women	GOAL 3: Good Health and Well-being	GOAL 12: Responsible Consumption and Production
GOAL 4: Reduce child mortality	GOAL 4: Quality Education	GOAL 13: Climate Action
GOAL 5: Improve maternal health	GOAL 5: Gender Equality	GOAL 14: Life Below Water
GOAL 6: Combating HIV/AIDs, malaria, and other diseases	GOAL 6: Clean Water and Sanitation	GOAL 15: Life on Land
GOAL 7: Ensure environmental sustainability	GOAL 7: Affordable and Clean Energy	GOAL 16: Peace and Justice Strong Institutions
GOAL 8: Develop a global partnership for development	GOAL 8: Decent Work and Economic Growth	GOAL 17: Partnerships to achieve the Goal

Important aspects which need to be emphasized in relation to the Agenda 2030 include the need for significant changes in consumption and production. They are reflected in, both in the form of a commitment to make *fundamental changes in the way that our societies produce and consume goods and services*, and through one of its 17 SDGs dedicated to ensuring SCP (SDG 12) (Akenji and Bengtsson, 2014). Elements of SCP, including improvements in energy-efficiency, are also included in the other SDGs (Bengtsson et al., 2018). Health aspects included in both sets must be emphasized since health represents a fundamental factor and component of wellbeing. SDG 3 is wider-ranging compared to the health goals in MDGs that were limited to child and maternal mortality and communicable diseases. However, the social determinants of health are also addressed through the majority of the remaining Goals 1-13 and 16.

To sum up, a number of differences between the MDGs and the SDGs can be identified. MDGs focused on developing countries with funding from developed countries. All countries are concerned in the SDGs. While the MDGs include 8 goals, 21 targets and 63 indicators, the SDGs include 17 goals and 169 targets. MDGs were created by a group of experts in the *basement of UN headquarters* while the SDGs have evolved after a long and extensive consultative process, including the participation of general public (see more in Kumar et al. (2016)). The pillars of human development, human rights and equity are deeply rooted in SDGs and several targets seven explicitly refer to people with disabilities, six to people in vulnerable situations, and two to non-discrimination. These were not mentioned in the MDGs. While the MDGs had 3 direct health goals, 4 targets and 15 indicators with emphasis on child, maternal mortality and communicable diseases. SDGs have one comprehensive goal emphasizing wellbeing and healthy living (a crucial goal emphasized above). The MDGs had a time period of 25 years though adopted in 2002 baseline data for the year 1990 was used and some of the baselines were revised subsequently which shifted 'the goal post'. For the SDGs, the baseline is from 2015 estimates. It may be revised as more recent data becomes

available. The SDGs include a vision of building systematic partnerships with private sector to achieve SD. MDGs had no concrete role for the Civil Society Organizations (CSOs), whereas SDGs have paid attention to this right from the framing stage itself with significant engagement of civil society actors (Kumar et al., 2016)

In relation to the crucial recent unsustainable trend and global problem which is climate change, the Paris Agreement was accepted within the United Nations Framework Convention on Climate Change (UNFCCC) at its 21st Conference of the Parties (COP 21) in 2015. Its goal is to limit global warming to well below 2, preferably to 1.5 degrees Celsius compared to pre-industrial levels. The most recent milestone in this area is the COP 26 (31 Oct – 13 Nov 2021). The importance of international cooperation in addressing climate change and its impact in the context of SD and efforts to eradicate poverty was emphasised. The destructive impact of the coronavirus 2019 pandemic was also recognized. The importance of ensuring a sustainable, resilient and inclusive global recovery was emphasised. This is as crucial an aspect for the social dimension as for the whole of SD. The final decisions have just been formulated and it will be seen after some time how successful this Climate Change Conference was. Next, the conclusions resulting from the analysis of history and crucial scientific works dealing with SD are summarized.

3. Conclusions

The crucial milestones in the development of the SD concept, including the crucial publications, *The Limits to Growth* (Meadows et al., 1972) and *Our Common Future* (WCED, 1987), which determined the foundation of this concept, were introduced. The crucial conferences and strategies were also identified, and the current global Agenda for SD introduced. A growing number of publications on sustainability/SD has led to the perception of sustainability science as a distinct field of science. Within sustainability science as well as in the practical application of sustainability/SD strategies, the challenges for the future include addressing crucial sustainability problems and advancing research, methodological aspects and the institutional background for putting the sustainability/SD concepts into operation, and on the basis of this thoughtfully responding to public sustainability concerns. As regards the most recent milestones in the field of SD, at the UN Millennium Summit in September 2000, a commitment to a new global partnership to reduce extreme poverty in its many dimensions was adopted, and a series of time-bound targets, Millennium Development Goals (MDGs), were set out. In the field of environmental protection, the Millennium Declaration stated that no efforts must be spared to avert the threat of the planet being irreversibly affected by human activities. The following and the current global Agenda for SD is the UN Agenda 2030, including the set of Sustainable Development Goals (SDGs) formulated by the UN in 2015. It would be desirable that the UN Agenda 2030 not repeat the insufficiencies of previous programmes, such as lack of action and practical orientation or failure to create win-win strategies. However, this cannot be evaluated until a longer period after its implementation.

The relationships between the MDGs and SDGs, as the crucial most recent global agendas for achieving SD, can be summarized as follows. The first set is built on the second. The SDGs can be divided into three categories. The first group is an extension of MDGs and it includes the first seven SDGs. The second group, including jobs, infrastructure, industrialization, and distribution, can be referred to as inclusiveness. The third group involves the last seven goals focusing on sustainable cities and communities, responsible consumption and production, life on land and below water, climate action, peace and justice and the means of implementation, and global partnership to achieve it. All these topics are crucial for achieving global SD in general, while particular countries (and lower units within them) can flexibly prepare strategies on the basis of their situations and developments in particular areas and the relationships between them.

For a deeper understanding of the content of the SD concept, the differences between concepts of SD and sustainability need to be analysed in more detail. The related basic and more practical concepts, and alternative scientific concepts need to be analysed and correctly understood. This will be discussed in the second part of this paper.

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