

2. Sustainability

Watching the news or reading newspapers on any given day leads to being confronted with one word over and over again: sustainability. Sustainability or sustainable development has become a commonly used and rather familiar slogan. It is used by politicians, researchers and journalists, but is also increasingly found in regular conversations.

A 2009 survey of the Bertelsmann foundation (BERTELSMANN STIFTUNG 2009) found that 62% of young Austrians and Germans interviewed had already thought about questions associated with sustainability.¹ Another representative survey conducted in 2010 by the Federal Environment Ministry of Germany (BMU) and the German Counsel on Sustainable Development showed that the degree of familiarity with the concept of sustainability increased more than threefold within a few years. In 2000, only 13% of the interviewees had heard of the principle sustainable development; this percentage increased to 43% in 2010 (RAT FÜR NACHHALTIGE ENTWICKLUNG 2010; BMU, UMWELTBUNDESAMT 2010)².

A simple search of the web via Google yields more than 200 million hits for “sustainable development” and more than 100 million hits for “sustainability”³. Even assuming a large number of double hits, irrelevant pages and outdated results, those numbers are impressive. Anyone watching the news or reading newspapers cannot escape the term either. Sustainability clearly is not a concept known only to a handful of scientists in their ivory tower.

It being such a widely known concept, one has to wonder whether everyone has the same understanding of the term and whether there is a commonly known exact definition. The examples cited above, the web links containing the term, the news shows and newspaper articles, the interviewees asked about their knowledge about sustainable development – are they talking about the same concept? On closer observance, they do not have much in common. They come from different areas – the performance of companies, insurance issues, sports, museums, politics and environment, just to name

1 The question asked was: „Have you ever considered whether your way of living might harm other people, future generations or nature?“ Detailed analysis revealed that the likelihood for a positive answer increased with the level of education.

2 The question asked was: „Sustainable Development is sometimes appears as a general principle for environment protection. Have you or have you not heard of this principle?“

3 <http://www.google.de>; searched September 2013.

a few. They are used in different contexts and with different emphasis. So either people are talking about different concepts with the same name; or sustainability is a very comprehensive concept with a definition that allows for a generous application in various contexts. Of course it is also possible that the term is often used incorrectly and is not suitable for the situations it is applied to. While this latter possibility raises an interesting research question – whether a possibly widespread erroneous and misleading use of an accepted and positively connoted concept is coincidental or intentional – it will be discarded for the purpose of this work, as the inaccurate use of catchphrases belongs to a different field of research.

If it was the option of different concepts sharing the same name, research on the topic would have to differentiate between the different forms of sustainability, and their respective definition and application. It would then have to decide which of the definitions is applicable for researching labor market policy. This option has to be kept in mind, as it is possible that the people using the term “sustainability” have different definitions or concepts in mind when doing so. The relevant question would then be whether the different ideas about sustainability that people intend to convey are due to the fact that there is no such thing as the one true definition of sustainability, or whether they originate in an inadequate knowledge of this one true definition.

As the following sections will show, most “official” definitions (i.e., those used by researchers, public and political institutions) stem from a common origin, which contradicts the theory that there is no one basic concept of sustainability. At the same time, this fact does not preclude the hypothesis of the different concepts people have in mind when using the terms “sustainability” or “sustainable development”. Based on an elementary definition, the concept may have been developed into different directions by different stakeholders. This possibility will be discussed in subsection 2.3.

However, if sustainability is an inclusive concept with a very broad definition which can be applied to many different fields, how does one specify and implement a concept this comprehensive? And is the concept with all its comprehensiveness useful for precise political decisions? Is it useful as a vision and a goal for future development on the global, federal or communal level? Or does its generous applicability lead to an easy realization of its stipulations and is it not useful as a political concept? These questions shall be discussed during the course of this chapter.

2.1 The Evolution of the Concept

Historic roots of the concept of sustainability in Germany are traced back to HANS CARL VON CARLOWITZ, who, in 1713, wrote the “*Sylvicultura oeconomica*”, a guide to arboriculture. He criticized the short term orientation of the economy and describes the ecological limits to growth, all in reference to trees and woods. He only uses the word “nachhaltend” (sustainable) once, but explains his ideas assertively enough to be thought one of the fathers of sustainability in Germany (HABER 2011, pp. 10-11). His basic idea is to use the gains of the woods, not their substance (or, in other words, to use the interest, not the capital), and thereby preserve the resources (GRUNWALD, KOPFMÜLLER 2006).

The term, if not the concept in itself, as it most likely has been common knowledge with people working in agri- or arboriculture for a long time, has not been of specific importance in the following centuries. Its ever-growing importance is mainly due to three occurrences: The first is the publication of the Club of Rome’s *The Limits to Growth* in 1972 (MEADOWS ET AL. 1972). This was followed in the 1980s by the Stockholm Conference with the appointment of the World Commission on Environment and Development (WCED), commonly called the Brundtland commission after its Chairman Gro Harlem Brundtland, former prime minister of Norway, and its report “Our common future” in 1987. The third important event was the United Nations Conference on Environment and Development in Rio de Janeiro, commonly known as the Rio Conference, in 1992, the followed by the United Nations Conference on Sustainable Development held in the same place in 2012, therefore called Rio +20.

There have been other steps towards a wide acceptance of the concept, but those three single events are the starting point for many of those. They shall shortly be introduced here, as understanding the origins of the concept and its development is necessary when trying to fully understand it and to develop appropriate and useful indicators or indicator systems to assess its success.

2.1.1 The Limits to Growth

The Limits to Growth was the publication of an important research project that tried to quantify different global development possibilities using computer models and simulations based on the concept of System Dynamics⁴. Its intention was to show the result

4 The idea of System Dynamics is to include interdependence, mutual interaction, information feedback and circular causality in a dynamic model. The models are simulated as “a system of coupled, nonlinear, first-order differential (or integral) equations” (SYSTEM DYNAMICS SOCIETY

of individuals' behaviour on a global level and to discuss mankind's ability to understand, and deal with, the results of their actions. The study was commissioned by the CLUB OF ROME.⁵ The publication in 1972 has been widely disputed. It reports the results of simulations of economic and population growth under the constraint of limited resources. The underlying problem to be remedied was described by the authors as follows: "It is the predicament of mankind that man can perceive the problematique, yet, despite his considerable knowledge and skills, he does not understand the origins, significance, and interrelationships of its many components and thus is unable to devise effective responses. This failure occurs in large part because we continue to examine single items in the problematique without understanding that the whole is more than the sum of its parts, that change in one element means change in others" (MEADOWS ET AL. 1972, p. 11).

There have been many different interpretations of the study, ranging from claiming that the authors intended the prediction of the end of the world to seeing it as proving that economic growth cannot continue endlessly on a finite planet. It has been laughed about as a collection of predictions by alarmists and a work of Malthusians trying to repress economic growth. According to the studies' authors, "the intent of the project is to examine the complex of problems troubling men of all nations: poverty in the midst of plenty; degradation of the environment; loss of faith in institutions; uncontrolled urban spread; insecurity of employment; alienation of youth; rejection of traditional values; and inflation and other monetary and economic disruptions" (MEADOWS ET AL. 1972, p. 10). After the analysis of twelve different scenarios predicting possible outcomes of our world within the next century, based on a number of assumptions (RANDERS 2010), the authors came to the following conclusions:

1. "If the present growth trends in world population, industrialization, pollution, food production, and resource depletion continue unchanged, the limits to

2013). For an introductive overview see for example the homepage of the System Dynamics Society (<http://www.systemdynamics.org/>).

5 The CLUB OF ROME describes itself as "an informal association of independent leading personalities from politics, business and science, men and women who are long-term thinkers interested in contributing in a systemic interdisciplinary and holistic manner to a better world. The CLUB OF ROME members share a common concern for the future of humanity and the planet" (CLUB OF ROME 2013). The aims of the Club are defined as follows: "to identify the most crucial problems which will determine the future of humanity through integrated and forward-looking analysis; to evaluate alternative scenarios for the future and to assess risks, choices and opportunities; to develop and propose practical solutions to the challenges identified; to communicate the new insights and knowledge derived from this analysis to decision-makers in the public and private sectors and also to the general public and to stimulate public debate and effective action to improve the prospects for the future" (CLUB OF ROME 2013).

growth on this planet will be reached sometime within the next one hundred years. The most probable result will be a rather sudden and uncontrollable decline in both population and industrial capacity.

2. 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 state of global equilibrium could be designed so that the basic material needs of each person on earth are satisfied and each person has an equal opportunity to realize his individual human potential.
3. If the world's people decide to strive for this second outcome rather than the first, the sooner they begin working to attain it, the greater will be their chances of success.” (MEADOWS ET AL. 1972)

The study's novel approach and its results were widely discussed. One of its most renowned critics stated that “[t]he emergence of the anti-growth school was the latest peak in a long intellectual cycle of pessimism about economic growth that originated with Reverend T.R. Malthus in the early 1800s” (NORDHAUS 1992, p. 1). “The ultimate message was that so many constraints operate on the global economy that there is no way to wriggle out of the straitjacket of resource limitations” (NORDHAUS 1992, p. 3). NORDHAUS' critique is supported by STAVINS (1992), who in a discussion of NORDHAUS' paper *Lethal Model 2*, backs his critical point that exploration, discovery, technological progress and substitution are not or only indirectly included in the model.

This argumentation is also supported by Gunnar MYRDAL, a specialist on developing countries, who criticizes the data that is behind the simulation of the *Limits to Growth*. He points out that especially for developing countries the data is very weak. He also doubts that a global model is helpful in solving regional problems and adds that he considers the most pressing problems to be regional (MYRDAL, 1973 pp. 204-205; OLTMANS, CHOMSKY 1976, pp. 33-39). The critical points are extended to the 1992 update of the *Limits to Growth* (“*Beyond the Limits*”), which NORDHAUS (1992, p. 5) judges to be nothing but ““Lethal Model 2” with the same cast, plot, lines, and computerized scenery” instead of incorporating the critics notes and statements.

There are also defenders of the study, at least for its general idea, approach and its contribution to raising the public awareness for environmental problems.⁶ Newer publica-

6 A collection of published reactions and statements about the *Limits to Growth* by OLTMANS and CHOMSKY cites for example Jan TINBERGEN, who stresses the study's importance in communicating the phenomena it discusses; a point of view supported by Paul A. SAMUELSON, among others; even if both criticize the preciseness and assumptions of the model (OLTMANS, CHOMSKY 1976).

tions checking the predictions of *Limits to Growth* against reality showed that the results were not very far off the mark.⁷ The works' defenders also stress that the limits to growth described in the book are not, as is often assumed in discussions, limits of economic growth; instead the term refers to the limited growth of what is now called the *human ecological footprint*, a theory that many contemporary scientists, especially those concerned with sustainable development, support (RANDERS 2010). While the conclusions and statements of the Club of Rome's report were never completely removed from public, political and scientific awareness in the years after its publication, it has been cited and discussed with new force with the growing popularity of the sustainability concept.

2.1.2 The Stockholm Conference and the Brundtland Commission

The United Nations Conference on the Human Environment (UNCHE) took place in June 1972 in Stockholm (therefore often referred to as the Stockholm Conference). It was the first United Nations Conference on environment and is therefore often considered as one of the starting points of international environmental policy.⁸ The participants proclaimed that “[t]he protection and improvement of the human environment is a major issue, which affects the well-being of peoples and economic development throughout the world; it is the urgent desire of the peoples of the whole world and the duty of all governments” (UNCHE 1972, p. 2). This might not sound impressive today, but seen in its time this is a very important statement, as environmental policy, or international environmental policy in particular, were not at all mainstream.

The participants of the Stockholm Conference agreed on a number of principles that can be seen as precursors to the principles and measures adopted by later conferences dealing with sustainable development. Those principles stress the fundamental rights of man to freedom and equality as well as adequate conditions of life. However, they call for the protection of the environment for the benefit of present and future generations. They demand, for example, that “[t]he capacity of the earth to produce vital re-

7 TURNER, for example, shows that *Limits to Growth's* “standard run”, which is not one of the extreme scenarios but rather one of the “middle” options, closely matches the actual data (TURNER 2008, pp. 402-410), while SIMMONS (2000) finds that while some predictions of the study were rather correct, others were even overrun.

8 Some of the UN specialized agencies held conferences on the topic before 1972, e.g., the United Nations Educational, Scientific and Cultural Organization (UNESCO), with its *Intergovernmental conference of experts on the scientific basis for rational use and conservation of the resources of the biosphere* in Paris in September 1968, but those were conferences on a scientific rather than on the government level.

newable resources must be maintained and, wherever practicable, restored or improved” (principle 3) and “[t]he non-renewable resources of the earth must be employed in such a way as to guard against the danger of their future exhaustion and to ensure that benefits from such employment are shared by all mankind” (principle 5). They also already include the social and economic dimensions in their principles, thus uniting the three dimensions ecology, economy and social affairs that are to become the basic pillars of later sustainability strategies and principles (UNCHE 1972).

Ultimately, the Stockholm Conference led to the establishment of the United Nations Environment Programme (UNEP) (DRESNER 2008), the United Nations’ branch for environmental concerns, in December 1972. Almost a decade later, the next step towards a growing importance of sustainable development as a guiding principle in politics and business was the appointment of the World Commission on Environment and Development (WCED) in December 1983. Its mandate was defined as follows:

- (a) *“To propose long-term environmental strategies for achieving sustainable development to the year 2000 and beyond;*
- (b) *To recommend ways in which concern for the environment may be translated into greater co-operation among developing countries and between countries at different stages of economic and social development and lead to the achievement of common and mutually supportive objectives, which take account of the interrelationships between people, resources, environment and development;*
- (c) *To consider ways and means by which the international community can deal more effectively with environmental concerns, in the light of the other recommendations in its report;*
- (d) *To help to define shared perceptions of long-term environmental issues and of the appropriate efforts needed to deal successfully with the problems of protecting and enhancing the environment, a long-term agenda for action during the coming decades, and aspirational goals for the world community, taking into account the relevant resolutions of the session of a special character of the Governing Council in 1982; (...)* (UN GENERAL ASSEMBLY 1983).

The UN General Assembly was aware of the necessity to not only provide an assessment of the current environmental and developmental situation, but rather a practical guide offering strategies to implement sustainable development. Therefore, the commission’s members were chosen from many different political backgrounds – e.g., finance, planning, science, technology or agriculture. This was to ensure that political principles would be observed, thereby simplifying the realization of the commission’s findings (WCED 1987b).

The commission's 1987 final report *Our common future* stated clearly that it addressed governments and their agencies and ministries, but also private enterprises. But first and foremost the commission's findings were for the people, particularly the younger generations, directly or through groups, NGOs, the scientific community, and educational institutions; as they would have to understand the concept and have an interest in providing a future for their children (WCED 1987b). Thus being a report by experts on all fields for all human beings whatever their capacity or office, the report was widely accepted. *Our common future* was judged to have made an important contribution to a rising awareness of the importance of sustainable development in decision-makers but also with the general public (WCED 1987a). It contains very probably the most cited definition of sustainable development (cf. subsection 2.2) and is therefore considered something of a starting signal for a deeper engagement with the concept on all levels of society.

2.1.3 The Rio Summit in 1992

The third milestone is the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro in 1992, also called The Earth Summit. This conference was truly global, 172 Governments participated, 2.400 representatives of NGOs were present; and an additional 17.000 people attended the NGO forum that took place as a parallel event. The resulting documents were the Rio Declaration on Environment and Development; the Statement of Forest Principles; the United Nations Framework Convention on Climate Change and the United Nations Convention on Biological Diversity (UNITED NATIONS, 1997).

The conference reaffirmed its former declaration, adopted at Stockholm in 1972, and stressed the importance of international agreements (UNCED 1992b). In a new declaration, 27 principles were proclaimed. Relevant principles for sustainable development were, among others, the following:

“Principle 8: “To achieve sustainable development and a higher quality of life for all people, states should reduce and eliminate unsustainable patterns of production and consumption and promote appropriate demographic policies.

Principle 9: States should cooperate to strengthen endogenous capacity-building for sustainable development by improving scientific understanding through exchanges of scientific and technological knowledge, and by enhancing the development, adaptation, diffusion and transfer of technologies, including new and innovative technologies.” (UNCED 1992b)

The problem with the resolutions of the Rio Conference was that they do not contain precise and verifiable commitments. The 27 principles proclaimed request international cooperation and protection of the environment, and to achieve a higher quality of life for all people, but do not set any specific goals or timetables. The specification and implementation of concrete actions was left to the individual governments, yielding very diverse results. Most of the principles do sound reasonable at a first reading, but raise questions at the second glance. Who decides which patterns of production are unsustainable and which indicators are used for the decision? If a higher quality of life for all people (including those in countries with an already high standard of living) is to be reached, how is the quality of life to be measured? And is the goal to realize equal quality of life for all people or an improvement of every (or some) individual's current situation? And who decides on the criteria for the measurement, which priorities are to be set and who will pay for the implementation of measures? Is it acceptable to diminish some people's well-being in order to achieve a general improvement of the quality of life? Who controls the implementation of measures, and are there penalties for countries or institutions if they do not adhere to the rules towards a sustainable development? The list of questions can be prolonged almost infinitely. The large number of open questions shows that the goals proclaimed after the Rio summit were too vague, and therefore not entirely helpful in furthering the development of precise measures and milestones to be reached.

The participants of the conference agreed to implement the principle of sustainable development in the 21st century. The so called Agenda 21 was presented, its novelty being an approach that considers ecological, economic and social dimensions as equal. However, it stipulates that in a long-term approach, economic and social activities have to play a subordinate role to the ecological dimension. This was required on the grounds of the boundaries of the ecological dimension that may not be overstepped if the survival of the human race is to be ensured. All members of the EU as well as most OECD-member states implemented national sustainability strategies until 2002, as required by the decisions adopted during the 1992 Rio de Janeiro conference on sustainability (SCHEER 2006, p. 25). Whether the implementation was successful and will succeed in the long run remains to be seen.

The overall success of the conference and its decisions is debatable. Firstly, the idea of international action towards the protection of the environment was by far not embraced by all. Especially developing countries that did not have the problem of too many factories polluting the environment, but rather the opposite, apprehended the utilization of the environmental considerations as excuse to create new trade barriers to slow their development (JOHNSON 2012). Secondly, the development and implementation of

measures and strategies towards sustainable development were left in the hands of individual countries and governments. There was no generally binding set of deadlines, which diminished the effectiveness of the conference's results.

Another possible reason for not reaching the goals stated in Rio 1992 are the changing geopolitical realities such as new emerging powers (UN DESA 2012b). In the 2012 publication *Back to Our Common Future* it was acknowledged “that, since 1992, there have been areas of insufficient progress and setbacks in the integration of the three dimensions of sustainable development” (UNITED NATIONS 2012). A group of UN representatives researching the progress in reaching sustainability concluded that the hopes of Rio 1992 were not fulfilled, even if some successes were achieved. They also stated – as has been specified by many others before them (cf., e.g., the BRUNDTLAND report) – that most problems on the road to sustainability cannot be solved independently from others by one single party, thus creating the need for common action (UN DESA 2012b).

2.1.4 After Rio 1992

The Rio conference was followed by a succession of other conferences, namely the International Conference on Population and Development in 1994, the World Summit for Social Development in 1995 and the Kyoto Climate Change Conference in 1997, all but the latter ending without specific contracts⁹. In 2002, the World Summit on Sustainable Development (WSSD), also called the Earth Summit or, in reference to the first Earth Summit in Rio de Janeiro ten years before, colloquially Rio +10, took place in Johannesburg. It is often noted that the United States, as one of the biggest global players not only where pollution, economic power and influence are concerned, were absent from the Summit¹⁰. The Johannesburg Plan of Implementation listed many commitments, many of them with numeric specification and dates by which these goals were to be reached. For example, the proportion of people suffering from hunger was to be halved by 2015. By 2020 the lives of at least 100 million people living in slums were to be improved. The proportion of people without access to safe drinking

9 The Kyoto Protocol, relevant for sustainable development only with regards to the environmental aspects, contained commitments towards the reduction of greenhouse gases and was ratified by 192 parties, the United States not among them. (UNFCCC 1999)

10 George W. Bush decided to not attend the Johannesburg Summit, sending Colin Powell in his place – the latter only putting in a very short appearance. The gesture was judged to be clear and in line with the US decision not to ratify the Kyoto protocol and Bush Seniors only very short appearance at the Rio conference 10 years prior. This was expected to pose a significant obstacle towards gaining feasible results of the conference (FREEDLAND 2002).

water and basic sanitation was to be halved. Production and consumption were to become sustainable with the help of a 10-year framework of programs. There were also numerous commitments towards an improved management of the natural resource base and health, among other topics. To realize these goals, the commitments also contained measures to establish an institutional framework for sustainable development on the global and national levels (UN DESA 2002). The pledges were ambitious, but their realization was not enforced and even if there is no regular monitoring of the complete list, ten years after the adoption of the goals it can be said that many of the commitments have not been achieved (UN DESA 2012b).

After the limited success of former conferences and meetings, the hopes pinned on the United Nations Conference on Sustainable Development (UNCSD) in Rio de Janeiro in 2012 (also called Rio 20+ as a follow up-conference to the first Rio summit 20 years prior) were not too high. In preparation for the conference, a United Nations project named “sustainable development in the 21st century”, better known by its abbreviation SD21, offers an assessment of current studies as well as a vision of sustainable development in the 21st century. The project’s objective was to gather knowledge, lessons learned, data collected in recent years and current research results, to offer a substantial and relevant contribution for the UNCSD. It was also expected to contribute to discussions and further research on the topic as a whole (UN DESA 2012b). SD21 research was to be composed of four main elements, namely an assessment of the execution of decisions and strategies from former conferences; modelling long-term scenarios for sustainable development; research on certain areas of sustainable development such as energy or land use; and the design of a long-term vision for sustainable societies which was to be based on the models of ecological economics. This combination of research topics is to be kept in mind as it is structured in a way used for many evaluations and assessments not only in sustainability research.

After Rio 20+, governments, civil society groups, academia and the public had and have very different opinions on the progress made so far and the approach to be taken in the future. Opinions vary greatly on whether the path to be taken is clear, the means are there and the only thing lacking is the political will, or whether the plan and the means are lacking as well. The only thing most groups concerned agree on is that the path taken at the moment is unsustainable (UN DESA 2012b).

2.2 Definition

All discussions of sustainable development were based on the same general idea, on a common guiding principle. But whether everyone involved in the conferences and

studies about the topic has the same understanding of the specifications of this guiding principle is arguable. There are a confusing number of definitions around, some of which differ only in wording, others in precision or applicability. Some of the definitions include specifications of single components, others are rather general.

2.2.1 General Definition

It is necessary to differentiate between sustainable development and sustainability. The former is the process of changing society, while the latter describes the end of the process, i.e., a status or a condition (Grunwald, Kopfmüller 2006). Thus, to reach sustainability it is necessary to enable development to be sustainable, making sustainability the long-term goal or vision and sustainable development the path towards the realization of the goal. Most characterizations refer to sustainable development. The definition most others are based on is the definition of the WCED that was published in the BRUNDTLAND report (cf. subsection 2.1.2):

„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:

- *the concept of 'needs', in particular the essential needs of the world's poor, to which overriding priority should be given; and*
- *the idea of limitations imposed by the state of technology and social organization on the environment's ability to meet present and future needs.*” (WCED 1987b, 41/1-3)

The WCED definition has been the basis for many other definitions. Some are simply paraphrases, e.g., EKARDT's “Sustainability or sustainable development means that future generations will be able to live, but also that all members of the current generations do” (EKARDT 2005, p. 25).

Others widen the concept, e.g., ROGALL who defines that “Sustainable Development aims, in addition to international justice for present and future generations, to establish high ecological, economic and social-cultural standards respecting the limits of the environmental space.” (ROGALL 2007, p. 37) or aim to specify it, such as the german NETWORK FOR SUSTAINABLE ECONOMICS who rephrases the definition into “Sustainable development aims to realize adequately high ecological, economic and socio-cultural standards within the limits of the natural capacity of the earth for current and future generations, thus enforcing the principle of intra- and intergenerational justice” (NETZWERK NACHHALTIGE ÖKONOMIE 2012a, p. 2).

Another adaption comes from LUDWIG who demands at least somewhat tolerable living conditions for future generations and the chance for economic development for current generations in developing countries. He describes sustainable development as economic development that aims to regenerate or restore production and living foundations by changing current production and consumption patterns (especially in industrialized countries), thereby creating conditions of a living that can be durable for an indefinite period of time (LUDWIG 2001, p. 3).

What those definitions have in common are the aspects of time (current vs. future generations) and needs. The definitions of ROGALL and the NETWORK FOR SUSTAINABLE ECONOMICS include three areas within which sustainability is to be reached – the ecological, economic and sociocultural dimensions – but also stress that natural limits have to be respected. The hierarchy of importance of the dimensions shall be discussed in subsection 1.7. The differences between the various definitions can be attributed to the complexity, but also the dynamics of reality and the concept (GROBER 2010). But there are other, more methodological, reasons for the differences. The existing definitions of sustainability or sustainable development are either very general or very specific, depending on the context they are made for. As a general principle, certain vagueness in the definition is to be expected, as a rather superficial and unspecific definition can be adapted to any situation and is therefore more likely to be widely accepted. The concurrent need for a specific definition for concrete topics is in stark contrast to the fact that it is impossible to find a useful global definition due to the complexity of the general principle, and the different initial situations and the different needs (GÜNTHER, SCHUH 2000).

2.2.2 Sustainability as a Concept

A definition can only be the starting point for the development of concrete concepts. Sustainability is not a clear vision, presenting a future world with clear images of its design in all areas. Rather, it is a concept, a way of thinking that allows to imagine – and eventually to create – a large number of different future worlds. Therefore, a successful concept of sustainable development must include minimum requirements (what needs to be sustained, developed) as well as showing possible paths to realize the maintenance of the minimum requirements, leaving policy makers and all involved in the development and the execution of measures towards sustainable development freedom to set their own focus points. This guarantees a common denominator globally, while giving flexibility on a national and regional level (UN DESA 2012b). A person or group developing a definition of sustainability (with the intent to use that definition

for projects, programs, publications, etc.) might have different objectives – benevolent or not. A political party might plan to maximize votes, companies are more interested in minimizing costs or gaining customer interest and approval, a group of nature and environment protectors will likely focus on environmental protection (TREMMELE 2003), and scientists are possibly looking for an all-encompassing definition applicable for each and every situation or a definition adapted to their specific field of research. While the latter are hopefully rather objective, if maybe either too general or too specific in their definitions, politicians' objectives could lead to definitions that are not helpful at all because they are too vague or aimed at enabling a ruling party to easily reach their self-defined goals and thereby gaining public approval while investing minimum effort and resources. Of course, political definitions can also be helpful and constructive towards realizing sustainable development.

In summary, there are manifold reasons for the different definitions and interpretations of the concept. Possibly the most important reason is that the parties involved have different perspectives, values and prioritizations and their interpretations are therefore based on different angles. This also includes different aims and intended uses and applications for the definitions. Another reason may be the differing perceptions of time frames. For a politician, any period exceeding an election period may be considered long-term, whereas environmentalists may consider such a period as a rather short-term approach.

JACOBS (1991) calls concepts allowing for a large number of competing interpretations "contestable". Sustainability is not the only widely known contestable concept; many political concepts share this property, for example liberty, (social) justice or democracy. Those contestable concepts are easy to agree on but there are many different interpretations and specifications when it is necessary to find a precise definition to implement the concepts. The precision and unambiguousness of a concept can be defined as follows: "A concept is precise if a person who knows the meaning of the concept can decide for every fully described issue whether the concept applies or not" and "a concept is unambiguous if all persons who know the meaning of the concept come to the same decision regarding the application of a fully described issue to the concept" (TREMMELE 2003, pp. 33-36). Following this explanation, the more general definitions such as the one from the Brundtland Commission are not precise, as they raise too many questions about their components; for example about the definition of needs, about the prediction of future needs, about the substitutability of (environmental) goods when assuring the possibility to fulfill future generations' needs, etc. They may be unambiguous, though, because they are vague enough to be clearly suitable and applicable for the issues described.

GÜNTHER and SCHUH describe the correlation between specification and consensus as follows: the higher the consensus, the more general is the principle. If specifications are necessary, for example to formulate measures, the consensus decreases (cf. Figure 1). This complicates the definition of sustainability or sustainable development, as it is necessary to find a precise definition that can be used as a guideline for application within political concepts, but also one that stakeholders from many very different fields can agree on – a task that is most likely impossible. So even if stakeholders were interested in a useful and specific definition of sustainability that everyone could agree to, it is likely that they would not succeed in formulating one. In cases where there is no interest in a serviceable description of the concept – possibly because the term is used as a figurehead meant to prove that its user is up to date and interested in the “good kind” of development, but is not intended to provide advice for actual action – the interest in a very general definition is indisputable anyway.

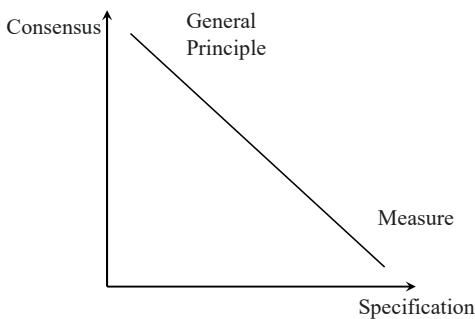


Figure 1: Consensus and specification of definitions

(GÜNTHER, SCHUH 2000, p. 16)

Political objectives and their influence on sustainable development will be discussed in more detail in subsection 2.3, as they are relevant in a field that is dependent on politics for its realization.

All in all, the statement that “under the heading of SD [Sustainable Development] a number of (partly) inter-related issues such as environmental exploitation, demographic changes, economic destabilization by financial crisis or poverty are subsumed. Hence, SD rather constitutes a global, political agenda than a theoretical conception” (GUTWALD et al. 2011, p. 2) is a good summary. This view is also supported by

DRESNER (2008), who states that to agree with the concept does not mean to agree with a specific decision, but rather with the underlying values.

As to the acceptance of the concept it seems that it is generally accepted and an indisputable guiding theme for politics (ILLGE, SCHWARZE 2004), even though there are those environmentalists who suspect that a concept such as sustainability that has been as readily and widely accepted by politicians might be meaningless (DRESNER 2008). Politicians who agree on the concept (if disagreeing with regard to its content) are criticized for their disagreement on the political measures and instruments that could bring society closer to a realization of sustainability (DIEFENBACHER 2001). This discord may be one of the reasons for the criticism voiced – understandably, as a well-defined concept that does not lead to useful measures for its realization is of little help outside some ivory towers of science. The ambivalent judgment of the concept shall be discussed in further detail in subsection 2.3.

The discussion about the definition of sustainability or sustainable development helps to identify the relevant criteria for a sustainable development. Important factors mentioned in the definitions are (the observance of) natural restrictions, limitations posed by technology and society, intra- and intergenerational justice as well as the concept of “needs”. ANT summarizes the basic ideas as multidimensionality, nonlinearity, integration, balance, participation and pluralism (ANT 2008b). Those crucial points and factors shall be discussed further in the process of this work.

2.3 Intra- and Intergenerational Justice

In its definition of sustainable development, the BRUNDTLAND COMMISSION states that the central guiding principle the concept was to become should ensure the possibility to meet the needs of the present while preserving future generations’ ability to meet their own needs. While the concept of *needs*, or rather its definition and application, is very open, this clearly means that the commission sees equality between intragenerational and intergenerational fairness (JÖRISSEN, COENEN 2003). The German Network for Sustainable Economics seconds this interpretation in its own definition “Sustainable development aims to realize adequately high ecological, economic and sociocultural standards within the limits of the natural capacity of the earth for current and future generations, thus enforcing the principle of intra- and intergenerational justice” (NETZWERK NACHHALTIGE ÖKONOMIE 2012a, p. 2). The employment of the terms *fairness* or *justice* in this context is rather unspecific, though, as the parties concerned with sustainability have different ideas about how fairness or justice can be defined in this special case and, eventually, realized.

2.3.1 Justice and Fairness

One of the main problems of the realization and implementation of policies toward sustainability is the concretization of justice. In theory, the case is clear. The OXFORD DICTIONARY explains justice as “just behavior or treatment”, “the quality of being fair and reasonable”; the CAMBRIDGE DICTIONARY enhances this explanation by stating that justice means “fairness in the way people are dealt with”. As *fairness* is used to explain justice, it obviously is mandatory to understand that term as well. The CAMBRIDGE DICTIONARY helps again by stating that fairness is “the quality of treating people equally or in a way that is right or reasonable” whereas the OXFORD DICTIONARY states that being fair means “treating people equally without favouritism or discrimination”.

Those definitions raise more questions than they answer. Treating people equally might be the law in many countries, but treating people equally on a global level when the surrounding circumstances vary greatly is likely an unsurmountable challenge and may lead to even greater inequality. Treating people in a way that is right or reasonable is too unspecific to help with a practical problem. The decision what is right or wrong depends on values, rules and norms of a society, and it is impossible to apply the values and norms of one society to another, thereby ranking one society's values higher than the other's. Seizing the core of treating members of a generation just is almost impossible, especially when considering the framework this is to be realized in. The same living conditions for everyone, even restrictingly assuming that every member of a generation aspires to the same lifestyle, might be realized given an indefinite supply of goods and the possibility to realize the same quality of life for everyone. This would require the means to not only provide the goods necessary, but also the leisure time, family surroundings and environmental conditions, among many other things. As goods are limited and as there are tradeoffs between the working time needed to achieve growth and the leisure time people wish for, between the supply of goods and environmental conditions, etc., the realization of justice by making everyone as well off as the societies with the highest welfare is not viable. This should not hinder the legislative and the executive to aspire to a society with at least more equal chances for everyone within current and future generations, though.

There are those who stated that as in developed countries the basic needs of the population are all but fulfilled, it seems legitimate to concentrate more on the intergenerational than intragenerational justice. Even if there existed an applicable concept of equality, how to realize equality between different generations poses an even bigger challenge: the knowledge about the needs of future generations. Assuming that basic needs are known or can be predicted (with more or less precision), we have no infor-

mation about their norms, consumption structures, production functions, political structures, etc. (GRUNWALD, KOPFMÜLLER 2006). Realizing intergenerational justice is also hindered by the fact that the persons concerned cannot plead their cause themselves (SRU 2002). This is one of the most important reasons for the lack of consideration of intergenerational justice (cf. subsection 3.3.4).

Neoclassic economic theory included resource questions by representing them as allocation problems. Later on, the intertemporal dimension led to an inclusion of distributive justice between generations into the theoretical economic consideration (HOLSTEIN 2003). The neoclassical option, the handling of justice issues as allocation problem, has the advantage of simplicity. The typical approach towards fair or just allocations is the efficiency criteria, namely the PARETO-efficiency and the CALDOR-HICKS criterion. The first states that any allocation where it is impossible to improve one concerned party's welfare or utility without decreasing another one's is to be considered efficient. As real life rarely provides politicians with situations where, to say it with MILTON FRIEDMAN, there is a free lunch, i.e., where it is possible to improve some peoples' situations without "paying" for it by a decrease in another area, this criterion does not leave a lot of room for improvement. The CALDOR-HICKS criterion describes an allocation as efficient if one party's utility can be improved to such extent that it is (theoretically) possible for them to compensate the others loss. This leaves a bigger range to make policy in, but to rely on this criterion assumes the possibility to measure utility. In addition, there is the open question of compensation and just or fair distribution of the gains.

Another theoretical approach to justice is JOHN RAWLS *theory of justice*, that discusses situations where a person puts "forward conflicting claims to the division of social advantages under conditions of moderate scarcity" (RAWLS 1971, pp. 110-111). He asks whether this person has obligations or duties to third parties such as future generations, and assumes that respecting future generations' needs has to be considered a moral responsibility. The criterion used to measure justice is benefit-based: the non-deteriorating welfare (HOLSTEIN 2003). While non-deteriorating welfare is a comprehensible concept, its implementation poses new problems. In theory, intergenerational justice can be based on an egalitarian approach where future generations must be enabled to enjoy at least the same level of quality of life as current generations. Non-egalitarian approaches only demand that future generations are left with minimum conditions of humane living. Current strategies are based on the egalitarian concept. Research on egalitarian conditions distinguishes between two subcategories, namely strong and weak sustainability, which will be discussed in detail in subsection 1.5 (SRU 2002).

It has to be kept in mind that many economic theories are based on a concept of human nature that assumes absolute rationality in every action of an individual, the so called *homo oeconomicus*. Current studies show, though, that a more balanced conception of human nature would be in order. Experiments prove the assumption of individuals without compassion, without a sense of justice and fairness and without irrationalities wrong (BERGHEIM, BÖCKERS 2010). As this work deals specifically with sustainability in the labor market and sustainable labor market policy, it is necessary to have a closer look at the social aspects of justice. To define and measure the fairness or justness of a certain subject, it is necessary to clarify the following issues:

1. It is necessary to determine the measurability of advantages, disadvantages, chances, etc. This is essential to allocate the corresponding goods/values. Often, preference fulfillment is the measure of choice.
2. The principles of justice have to be chosen. When formulating a strategy for justice, the distributive aims such as equality, sufficiency, etc., have to be chosen and agreed on.
3. Justification has to be provided. This is necessary to ensure objectivity and impartiality.
4. It has to be decided who is to be concerned by the specific definition of justice. All human beings or only a certain group of people? (GUTWALD ET AL. 2011)

These four points are in accordance with the requirements of a successful evaluation, the planning of political strategies and measures or, in fact, the procedures of any strategy, be it scientific, political or corporate.

2.3.2 Calculation

The calculations necessary to specify and quantify justice and fairness have occupied many scientists, commissions and politicians, as concrete numbers are necessary to communicate and, in some cases, get permission to realize, projects. There are different approaches possible, depending on the assumptions made about the requirements of future generations. The assumptions are based on ethical norms and on the time frame considered (KRYSIK 2007). PFISTER and RENN (1996) state that it is possible to determine the potential that is necessary to enable future generations to gain experiences that are desirable from a present-day point of view to be preserved.

One method of quantification is the balance of generations that aims to quantify a possible gap between revenues and expense employing a long-term approach. The basic idea is an intergenerative budgeting system that takes into account that current national

debt has to be repaid with the net tax payments of current and future generations. Net tax payments are defined extensively to include all payments made to the fiscal sector against payments and benefits received by the fiscal sector such as public goods, education and other transfers; this net value is then weighted with estimations of life expectancy and an estimated economic growth rate. This calculation yields, among other indicators, a balance of generations or, in other words, the implicit national debt. If this indicator is negative, the future claims of (future and current) tax payers, given the continuance of the current legal situation, are higher than the sums needed to pay off the debt, thus creating a so called sustainability gap (HAGIST ET AL. 2006).

The German Federal Statistical Office (DESTATIS) also collects data to monitor intergenerational justice, including environmental indicators such as the use of renewable energies or greenhouse emissions, GDP indicators such as government deficit, the investment quota or private and public spending for research and development, as well as educational indicators such as young people's degrees or qualifications (STATISTISCHES BUNDESAMT 2010a). These data give a hint to the state of provision for intergenerational justice, but do not offer an assessment at first glance, as the bundle of indicators does not set any priorities or weightings. The indicator bundle is not useful for an exact calculation. Another approach towards quantification is the requirement of a constant capital stock, defining sustainability as the situation where this capital stock is preserved. The maximum amount of goods that may be consumed during a period can be calculated as

Amount of goods to be consumed

= goods and services produced within period – degradation of capital stock

(PFISTER, RENN 1996, p. 9). What this calculation does not include is a specific definition of the capital stock to be preserved. A detailed discussion of the possible interpretations can be found in subsection 1.5. One of the challenges of calculating the necessary stocks and possible utilities of future generations are difficulties when estimating future values. For example, Cost-benefit-analyses are a common instrument to evaluate policy measures. To analyze long-term effects, discounting (and thus making results comparable) is often the measure of choice, given a monetary estimation of the effect. This implies that all eventualities would have to be predicted and included in the calculation (BAYER 2004). The advantages of discounting are for one that individuals tend to prefer current consumption over future consumption, as is proved for example by the large number of credits to finance current consumption instead of saving and consuming in the future. Also, economic growth means that future generations will be better off, therefore discounting is justified; and lastly, there is uncertainty re-

garding future developments and preferences of future generations, which some take to justify a concentration on current generations' needs. These reasons are arguable, though. A preference for current consumption does not increase the right to deplete natural resources, thereby diminishing future generations' chances for consumption. Also, it is highly disputed if economic growth really leads to increased wellbeing (cf. subsection 5.7). And the third argument for discounting, the uncertainty and thus the right to bias accounting toward current generations, is difficult for moral reasons, as the simple existence of uncertainty does not justify passing on the risk to future generations (SRU 2002).

Another disadvantage of discounting is that long-term effects and yields are discounted and therefore systematically smaller than contemporary effects, and thus biased towards those political measures in favor of current and at the expense of future generations. This leads to measures with high current costs but high(er) future benefits not being realized, but favors measures with current benefits but high future costs (BAYER 2004).

Another aspect that has to be taken into account is the existence of discontinuities. As they cannot be anticipated in most cases and disrupt natural as well as socioeconomic and political systems, they contest the system of discounting and the predictions or extrapolations this is based on (MYERS, KENT 2008). The unpredictability of future generations needs does complicate the adoption of measures appropriate for intergenerational justice. This should not be used as an excuse to dispense with the concept as a whole or to abstain from taking measures, though. The current calculation methods, if inadequate and in need of improvement, do offer a basis to start from.

2.4 Institutions to Further Sustainable Development

To implement the guiding principle of sustainable development in all levels of society, law-making and everyday life in general, it is necessary to institutionalize it. The UN stresses the need to integrate sustainable development on all levels while recognizing interlinkages (UNITED NATIONS 2012). Sustainability is a guiding principle. Therefore, it has to be kept in mind that the superordinate institutions of sustainable development are norms and values. This includes the explicit implementation of sustainability in all fields of politics and society, but also more implicit applications such as adapted lifestyles or company principles. Some scientists even suggest the inclusion of a fourth dimension, institutions, into the concept of sustainable development with its currently more or less undisputed three dimensions (ecology, economy and social). This column would comprise participation and justice as well as fields like public health or social

security and welfare. KLEINE (2009) considers this dimension rather as a cross-sectional task affecting the three traditional columns, because “institutions” concentrate on structural or procedural aspects rather than substantial aims. As the classical concept of sustainability assumes politics to be able to manage society, therefore showing a major potential to solve problems occurring when trying to reconcile the individual aspects of sustainability (WETZEL 2005), an efficient institutionalized approach is necessary.

The sustainability problem is a global one with local impact; institutions therefore have to be formed on a local, regional, national and global level. Apart from typical institutions on a government- or NGO-level, it is also essential to institutionalize sustainability as a guiding principle in education. This helps to establish sustainable development in all levels of society, thus raising acceptance and normalcy of the concept. Also, the topic has to be part of any technical and vocational training especially in, but not limited to, sectors where the lack of a skilled labor force can impede a country’s sustainable development (JANN ET AL. 2006). When discussing institutions it has to be kept in mind that while the economic approach to choosing the appropriate instruments to implement a policy or a program is to promote overall economic efficiency and social welfare, the political approach would be to not only consider those aspects, but to also include political and administrative aspects (HOWLETT 1991). The difficulty with political and governmental institutions is that they are fragmented and allocated to specific fields – in social policy, for example, there are health, education, labor, etc. – but there are usually no entities that connect all those different fields, let alone with superior rights to force the fragmented institutions to follow one guiding principle. An operationalization of sustainability is therefore rather difficult and remains organized in very small sections instead of concentrating on the big picture. The problem of the fragmented institutions can be solved by building institutional frameworks to meet the challenges of sustainable development. These frameworks must concentrate on four principles:

- (1) Improve governance
- (2) Improve measurement, monitoring and evaluation systems
- (3) Assess the roles of public and private actors
- (4) Increase the resilience of human and natural systems (UN DESA 2012b).

The following Table 1 gives an overview over the institutions on the different levels. This overview is incomplete and must remain so, as the number of institutions changes constantly and it is, especially on the NGO-level at the national and local stage, hard,

if not impossible, to identify all groups involved. The examples given are from a German point of view, thus choosing the European level as a reference between the global and national level, and German institutions on the national and local level.

INSTITUTIONS FOR SUSTAINABLE DEVELOPMENT				
Level	Global	European	National	Local
Political	- Rio- and Rio +10/20+ related: UNCSO, UNFCCC, Agenda 21, Johannesburg Plan of Action, SDG - UN DESA - UNEP - UNSDSN - ILO	- EU SDS - ESDN - Guidelines and decrees - EMAS-decree	- RNE - SRU - WGBU - Enquete Commission of the Parliament - National Sustainability Strategy - Environmental laws	- Local Agenda 21 processes
NGO/ company	- ESD - Dow Jones Sustainability Index - FTSE4GOOD - MSCI World ESG Index - Domini 400 Social Index - Green Cross International	- Green 10 (=10 biggest green NGOs in Brussels; eg. CAN Europe, FoEE, EEB) - EPE	- German Corporate Governance Index - Responsible Care - Germanwatch - NABU - BAUM	- Local youth organizations, environment groups, etc.

Table 1: Institutions and organizations concerned with sustainable development
(own selection)

Apart from the well-known institutions of the UN, it is interesting to note the institutions on the company level. Sustainability has become important enough for customers to incite the creation of company sustainability rules. Indices like the FTSE4GOOD, an ethical stock market index, ask companies who want to become part of the FTSE4Good Index to fulfill a number of criteria from different areas such as environ-

mental management, climate change, human and labor rights, supply chain labor standards and governance related criteria, namely concerning bribery (FTSE 2011). The Dow Jones Sustainability Index (DJSI) operates in a similar manner: a defined set of criteria and weightings is used to assess the opportunities and risks deriving from economic, environmental and social developments for the eligible companies (DJSI 2010). Institutions not included in the overview, but nonetheless indispensable for sustainable development, are some religious institutions, but more importantly education and research institutions.

It has been widely discussed that profound knowledge about sustainability and sustainable development are elementary for an eventual successful implementation of measures towards a more sustainable world, and the mainstreaming of the general principle that has been called for cannot take place without educated societies that understand the concept and its pre-eminent significance. The exemplary institutions listed above are only a selection out of a very large number of institutions on every level that are concerned with sustainability. The existence of such a large number of institutions is a first success, but it also does pose problems. It has been discussed in subsection 1.2, that the parties concerned often choose their own definitions of sustainability or sustainable development according to their aims and approaches. Based on their definitions, they decide on aims and measures to be taken. But as the number of institutions multiplies, the number of interpretations of the concepts does, too. A large number of institutions working independently of each other, sometimes competing for funding, supporters and acknowledgment, may actually slow down the process if they do not cooperate with each other. One example for such cooperation in Germany is the forum environment and development, a federation of 35 NGOs who developed their own set of aims and indicators towards a sustainable development (HENSELING ET AL. 1999). The collaboration of small NGOs leads to a multiplication of the individual influences and can thus further the propagation of the concept and increase the likelihood of success.

To further the general acceptance of sustainable development as guiding principle, the general public, but also decision makers on all levels have to trust institutions responsible for furthering the concept. A GLOBESCAN survey among more than 24.000 people in 23 countries from all continents found that interviewees attest scientists and NGOs the best performance, while national governments are rated poorly. When asked which institutions have the highest impact, NGOs were not considered very successful, though. Only scientists were rated to have both a high impact and a high performance (cf. Figure 2) (GLOBE SCAN/SUSTAINABILITY 2012b). These results should be worry-

ing the responsible institutions as those with the highest impact have low performances (excepting scientists) in the judgment of their peoples.

The survey also asked which institutions of sustainable development the interviewees trusted. Scientists ranked highest in their estimation with a net trust of 52 percentage points¹¹, followed by NGOs with a net trust of 29 percentage points. National governments enjoy a net trust of only 2 percentage points, an alarmingly low amount.

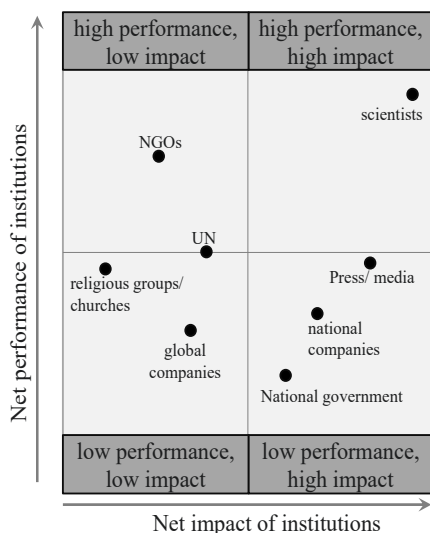


Figure 2: Potential impact and performance of institutions on sustainable development
(GLOBESCAN/SUSTAINABILITY 2012b, p. 12)

It has to be noted though, that there are large differences between industrialized and emerging economies. While in industrialized countries scientists are valued with a net trust of 63 percentage points, emerging economies award them a net trust of 43 percentage points. All in all, interviewees in industrialized economies were a lot more

11 The question asked was “And how much impact, if any, do you think each of these institutions can have in solving society’s challenges? And how well would you say each of the following institutions are doing in helping make progress on these economic, social and environmental challenges?”, with the answer categories “doing a very good job”, “doing a good job”, “doing a poor job” and “doing a very poor job”. Net impact is then calculated by answers “very good” and “good” minus “poor” and “very poor” in percentages (GLOBESCAN/SUSTAINABILITY 2012b).

critical towards (almost all) institutions than their counterparts in emerging economies. The biggest difference (apart from trust in religious groups and churches) can be seen in trust in companies. In emerging economies, global and national companies are rated as rather trustworthy, in industrialized countries the answers “just a little trust” and “not trust at all” prevailed (cf. Figure 3).

The most important and summarizing question, which institution the interviewed thought had the highest potential impact in solving society’s challenges, varies widely among countries. While some put their hopes on national governments (e.g., in Russia, China and Brazil), others rather trust scientists (e.g., Canada, India, Australia, and USA) or, as is the case in Germany, the national companies.

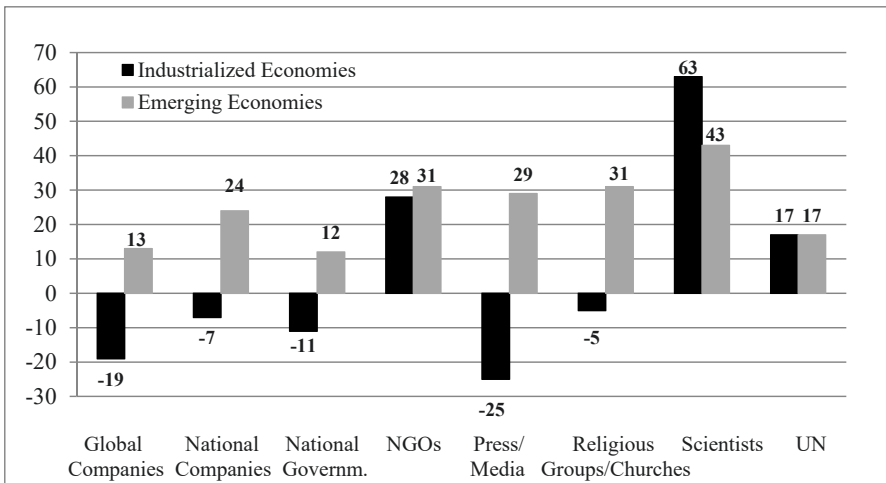


Figure 3: Net trust in institutions

Industrialized vs emerging economies, 2012 (GLOBESCAN/SUSTAINABILITY 2012b)

2.5 Characteristics of Sustainability

One of the areas where scientists’, but also institutions’ definitions and interpretations of sustainability greatly differ is the determination of the characteristics of sustainability. Assuming an agreement on one definition of sustainability or sustainability, for example on the definition of the Brundtland commission, the realization and implementation of the concept needs a closer inspection. The statement that “sustainable development, which implies meeting the needs of the present without compromising the ability of future generations to meet their own needs” (WCED 1987a) is necessary

leaves a number of questions open. One of those is the interpretation of how the ability of future generations to meet their needs is to be sustained. The most basic interpretation is that the capital stock of natural resources has to be sustained to the extent that the welfare of future generations can be comparable to that of the current generation (PFISTER, RENN 1996). The question of welfare and its comparability shall be briefly discussed in subsection 4.7, the point to be considered here is the sustaining of capital stock. There are three different interpretations of this fact:

- (1) Different kinds of capital¹² are interchangeable, but the total capital stock has to be constant. This means that it is acceptable to use all natural capital if it is replaced by another kind of capital stock. This concept is called weak sustainability.
- (2) Substitution between different kinds of capital is not possible/ allowed. Therefore, natural capital cannot be used and then replaced with another kind of capital stock. This concept is called strong sustainability.

As a compromise between (1) weak and (2) strong sustainability, the concept of “reasonable” or “balanced” sustainability has been suggested. This concept assumes that natural capital can be substituted to a certain level. Factor mobility is, under certain premises, possible. This compromise takes possible future technological development into account, even though the assumptions necessary to do so are restrictive (BLAZEJCZAK, EDLER 2004).

The basic distinction between weak and strong sustainability is whether human-made capital and natural capital are pooled or considered separate capital stocks (DRESNER 2008). A typical model that stands for weak sustainability is SOLOW’s neoclassic model. In this model, an intertemporal social welfare function aiming to ensure a non-declining level of benefit for current and future generations is employed. Limits to growth or the use of capital stock can be overcome by technological change, the substitution of manmade capital for natural capital and returns to scale. This allows for example for a degradation of the environmental situation if the decline of benefits caused therefrom can be compensated by an increased consummation of manmade goods. Other models, mainly argued for by ecologic economists, consider the protection of the environment as the only way to ensure sustainability (HOLSTEIN 2003; HAUFF, SCHIFFER 2013).

12 Suggested is for example a distinction between financial, natural, produced, human and social capital (GOODWIN 2003).

Both weak and strong sustainability have their advantages and disadvantages. One benefit of the concept of weak sustainability is that it simply assumes that the utility of future generations shall remain on the same level as that of current generations. This does not exclude the possibility of a future higher level of utility, of course, but also does not explicitly include it. This is due to the assumption that a higher utility in the future likely means that current utility could be increased without hurting the principle that future generations should be able to enjoy the same utility level. The idea of a certain utility level leaves open how that level is to be reached. As the same utility level can be achieved with different inputs or input combinations, it is not necessary that the current conditions are maintained. Thus, the concept is easier to implement than the concept of strong sustainability and the costs are likely smaller because there are more possibilities to find the most efficient way to realize the preservation of the welfare level.

A drawback of the model of weak sustainability is the non-predictability of technical progress. The concept allows for the substitution of natural capital with other forms of capital, so that the overuse of non-reproducible resources can be compensated by technical progress that allows to substitute the lost resources. As technological progress cannot be predicted, it is impossible to calculate the allowed actual use of natural resources to meet the conditions of sustainable development. In addition, most natural resources have different capacities; therefore a substitution of natural capital by technological progress has to fulfill all of those capacities, which will prove difficult in most cases (SRU 2002).

Strong sustainability, on the other hand, does not allow the substitution of natural capital. Thus, renewable resources may only be used to the extent of their regeneration. But non-renewable resources may not be used at all if adhering to the concept, that way neither current nor future generations would profit from the resources (SRU 2002). The concept asks for a comprehensive change of current production and consumption and will be hard, if not impossible, to implement.

The concept of “balanced” or “reasonable” sustainability has been introduced to combine the advantages of the two opposed concepts. It joins the ecocentric approach of strong sustainability and the anthropocentric view of the supporters of weak sustainability and develops an eco-anthropocentric concept that does not agree with the neo-classic efficiency triangle of technology, growth and market, but does not fully support the ecological approach of stopping economic growth altogether and concentrating only on ecology either. Table 2 offers an overview over the strategies discussed. All three options accept the constant capital rule as a foundation.

TYPES OF SUSTAINABILITY		
Constant Capital Rule		
Weak Sustainability	Balanced Sustainability	Strong Sustainability
• Purely anthropocentric • Harmony between growth and environment • Ecological capital fully substitutable • Pro-growth (with moderate environmental policy) • Strategy: efficiency through technology, growth and market • Conventional cost-benefit-analysis • Representatives: neoclassical economists (growth optimists)	• Eco-anthropocentric • Positive turnaround through environmental policy possible • Ecological capital partly substitutable • pro ecological/sustainable growth • Strategy: ecological consumption patterns and efficiency through technology, politics and market • Ecologically enhanced cost-benefit-analysis • Representatives: social scientists (growth optimizers)	• Ecocentric • Conflicts between growth and environment • Ecological capital not substitutable • Sustainable growth impossible • Strategy: stop growth, abdication and efficiency through individuals and politics • Against cost-benefit-analysis • Representatives: ecological economists (growth pessimists)

Table 2: Types of sustainability
(STEURER 2001)

2.6 Sustainability Models

An important aspect of mainstreaming the concept is to describe the theoretical models of sustainability in a clear and unambiguous way. Graphic representation is a factor that should not be neglected, as it helps understand the concept and eases the communication between different interest groups. Early sustainability concepts stress the ecological aspect and are therefore considered one-column-concepts, typically environment plans or –strategies (KLEINE 2009). Later models are more complex, the most important ones shall be described in the following subsections. The specific characteristics of each dimension will be discussed in detail in subsection 2.7.

2.6.1 The Pillar Models

The most basic model to depict sustainability is a three pillar or column model. The model is based on the assumption that all three pillars should be treated as equal. As the definitions of sustainability are often interpreted to refer to the three dimensions ecological, economic and social sustainability, especially after Rio 1992, the depiction is based upon those pillars. It is impossible to relate the three pillar model of sustainable development to a single author as it grew historically (KLEINE 2009). It is notable that each column stands for itself (cf. Figure 4). Sustainability is added as the uniting principle roofing the pillars.

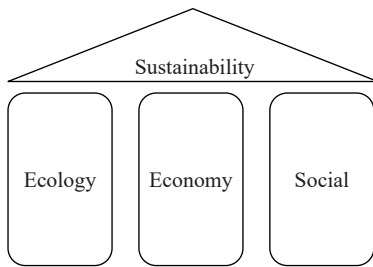


Figure 4: Three-pillar model of sustainability

(own depiction, model is used widely in scientific and popular publications in similar form)

The model has been politically influential in Germany and did further an increased appreciation of the ecological aspects, as it postulates the equality of economic, ecologic und social development. It is criticized, though, that the concept has been used as a kind of wish list, where individual preferences of stakeholders are written into one of the pillars, thus furthering arbitrary classifications and weightings (SRU 2002). Also, sustainability is increasingly seen as an integrated, holistic concept and the borders between the dimensions cannot be defined clearly (BUNDESREGIERUNG 2008). It is not always possible to distinguish, which action or right belongs to which column, and actions towards sustainability in one pillar may decrease sustainability in another sector (EKARDT 2005). If all pillars are treated as of equal importance, strong sustainability (cf. subsection 2.5) is impossible to reach. Without ecological boundaries, measures to realize economic and social sustainability would be allowed to deplete natural resources and could still be evaluated as successful.

Another version of the three-pillar-concept has been suggested by a joint committee of German and French experts on sustainability who, requested by the Franco-German

Ministerial Council, wrote a report on *monitoring economic performance, quality of life and sustainability*. Those experts suggest the following pillars to support political decisions:

- (1) Economic performance and material well-being,
- (2) Non-material well-being and quality of life,
- (3) Sustainability (can the current level of well-being be sustained for future generations?)

(CONSEIL D'ANALYSE ÉCONOMIQUE, SACHVERSTÄNDIGENRAT ZUR BEGUTACHTUNG DER GESAMTWIRTSCHAFTLICHEN ENTWICKLUNG 2011). This approach tackles one of the problems of the three pillar model with equal dimensions: that the three pillars belong to very different scientific fields. Therefore, the scientific development in every pillar, the identification of qualitative and quantitative targets, the design of indicator systems and all related research, have developed independent of the other pillars. That was probably unavoidable due to the growing complexity of the topic, but hampers the realization of sustainable development policies (KLEINE 2009). With the suggestion of the CONSEIL D'ANALYSE ÉCONOMIQUE and the SACHVERSTÄNDIGENRAT, the interdependence of the three dimensions is taken into account.

When discussing a model of three pillars, it is also necessary to keep in mind that the model may be appropriate for developed countries, where economic and social sustainability may not be realized yet, but where those two dimensions have already been brought to a high level, thus easing the concentration on the environmental pillar. This may look different in a developing country, where survival and economic growth, or an improved quality of life, take precedence.

The most important objection towards this depiction of sustainable development is the lacking consideration of links between the three dimensions. The basic fields of politics are usually easily linked to one of the three dimensions, but every factor is influenced by and influences other factors, thus creating a complex, interlinked model. An example of those links is shown in Figure 5. As the world we are living in is not one-dimensional, but rather complex, it is necessary to find a visualization of sustainability that at least begins to capture this complexity. The three pillar model is therefore not or only for limited purposes the optimum depiction.

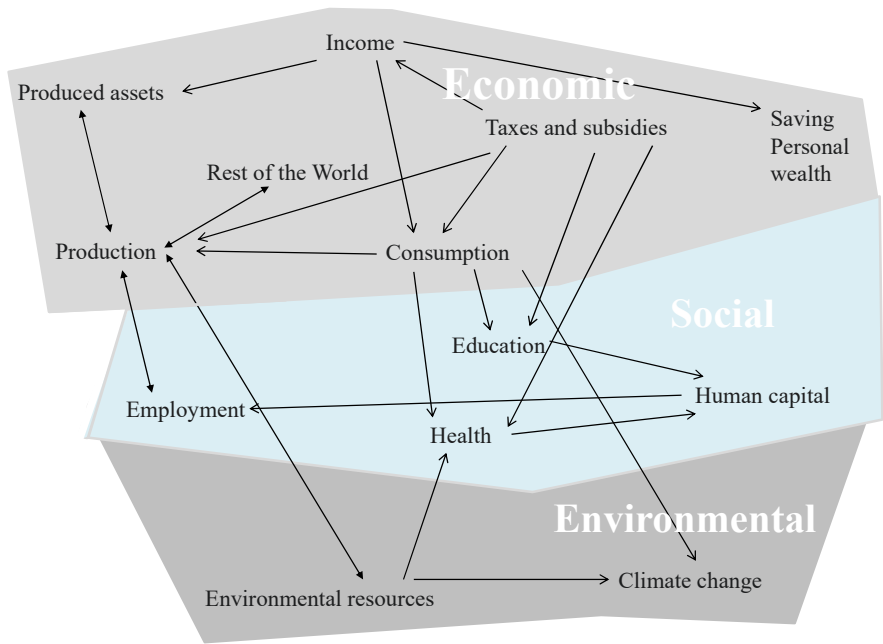


Figure 5: Links between the three spheres of sustainable development

(HARRISON 2000)

Several researchers advocate the inclusion of a fourth pillar into the three-pillar model (cf. subsection 2.6). This is a simple extension of the three pillar model comprising the ecological, economic and social columns and adding the institutional aspect (cf., for example, SPANGENBERG 2005). The intention of this fourth pillar is to ensure a comprehensive implementation of sustainability as guiding principle, and using the fourth pillar (or the roof for the other three pillars in some cases) as a cross-sectional task affecting the three traditional columns, because institutions concentrate on structural or procedural aspects rather than substantial aims (KLEINE 2009). This model faces the same criticism as the three pillar model as it does not observe the links between the pillars (aside from the institutional aspects) and does not depict a possible precedence of one column over the others. The three and four pillar model are in some cases complemented by an additional pillar depicting cultural aspects, but this dimension is rarely discussed extensively, as most argue that cultural aspects can be included in the social dimension.

2.6.2 Sustainability Triangle

Following the criticism of the pillar models, a triangle model has been developed to illustrate the dimensions of sustainable development with their links. The basic form of the triangle is shown in Figure 6. Measures and their effects can be allocated to either a point on the lines of the triangle, thus affecting only two dimensions, or any point within the triangle if all three dimensions are affected.

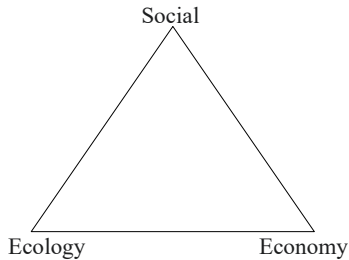


Figure 6: Basic sustainability triangle

(own depiction, model is used widely in scientific and popular publications in similar form)

The triangle is also endorsed by the german network for sustainable economics on the premise that the triangle is embedded within the boundary of the ecological limits (NETZWERK NACHHALTIGE ÖKONOMIE 2012a). The german government recently also turned away from the three pillar model and towards a triangle model that includes the absolute limit that the network for sustainable economics asks for.

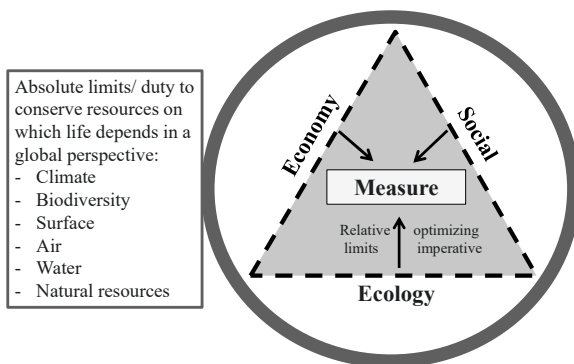


Figure 7: Sustainability triangle with absolute ecological limits

(SRU 2011, p. 5)

The sustainability triangle suggested by the GERMAN COUNCIL OF ENVIRONMENTAL ADVISORS (cf. Figure 7) is similar to the triangle used by the german government. It does stress the absolute ecological limit more clearly though and shows that sustainable development can only be realized within those absolute limits.

Another version of a Sustainability Triangle has been developed by VON HAUFF and KLEINE who favor a “magical” integrative triangle of sustainable development in an attempt to see the dimensions of sustainable development not as juxtaposing, but as an integrative concept that aims to harmonize the key aspects of sustainable development (cf. Figure 8) (KLEINE 2009).

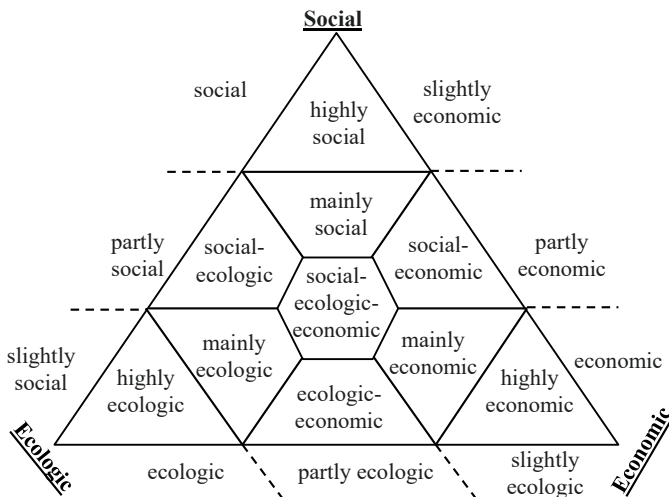


Figure 8: Integrative sustainability triangle

(HAUFF, KLEINE 2009)

The magical in the title of KLEINE’s depiction can be considered analogous to the so called *magical square* of German economic policy based on the German Stability Law that postulates in §1 that the federal government and the states have to choose their political measures to ensure stability of the level of prices, high employment, a balance in foreign trade and steady and adequate economic growth (STABG). These four requirements are often depicted as corners of a square and then called the *magical square* because the legally mandatory concurrence all four dimensions is impossible to reach

due to incongruity of the aims. While in some circumstances there is congruity¹³, there is incongruity in other situations¹⁴.

2.6.3 Sustainability Circles

Another option to depict sustainability and the connections between the dimensions is to use circles that overlap in the middle, symbolizing the connections between the dimensions. This version has the disadvantage that it is not possible to show the extent of the influence on one or the other dimension other than the attribution to one, two or three dimensions. In this case, the integrated sustainability triangle offers more exact options. Still, the basic circle model offers the advantages of showing the links between the dimensions and of allowing for the precedence of one of the dimensions. SCHRÖTER (2008) fills the dimensions with the corresponding properties, yielding an illustration as shown in Figure 9. For SCHRÖTER, the social component of the general principle comprises community development in all its forms – participation, meeting basic human needs, ensuring equity and justice, etc. The economic and ecologic dimensions are as expected. The distinctive feature of SCHRÖTER's model is that she only considers those measures, projects and situations as sustainable that are located in the intersection of all three dimensions.

HABER (2011) prefers a version with separate dimensions linked by certain actions depicting the influence from one dimension on the others (cf. Figure 10).

The dimensions are defined by the actions allocated to them: the economic sector is expected to secure material livelihood, the social dimension must concentrate on securing immaterial livelihood, while the environmental sector secures ecological stability. Both the economic and social sector must cater to the environmental dimension: the economy must reduce or avoid environmental impact and society must follow sustainability rules set by the environment. This leads to a certain precedence of the environmental dimension in the model.

13 cf., e.g., OKUN's law that states that economic growth leads to a high level of employment or more exactly, a 2% increase of GDP will lead to a 1% decrease of the unemployment rate. OKUN's law has been disputed and has been called a rule of thumb rather than a law as it is an empirical observation and not based on a theory.

14 cf., e.g., the Phillips curve that states that a decrease of the unemployment rate is correlated with an increased rate of inflation. This observation has been proved empirically for short term relations between the factors, but has been disputed for long-run predictions as both factors are influenced by many other parameters.

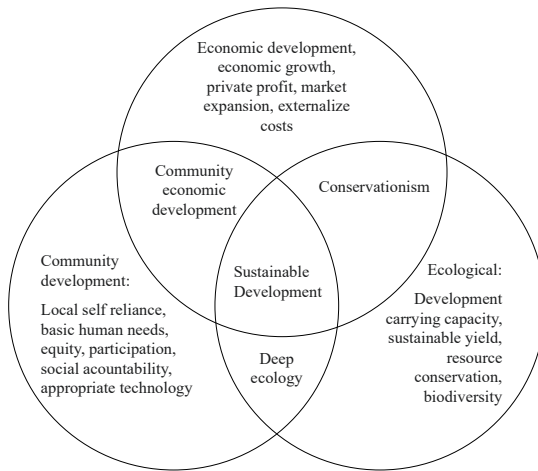


Figure 9: Properties of sustainable development
(SCHRÖTER 2008, P. 219)

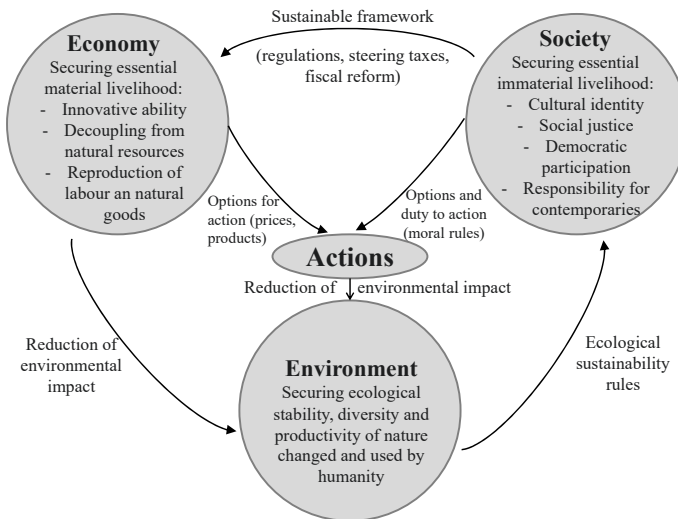


Figure 10: Elements of sustainable development
(HABER 2011, P. 23)

2.6.4 The HGF Sustainability Model

There are other concepts that should not be overlooked. The Helmholtz-Gemeinschaft (HGF), a community of German Research Centers of the Helmholtz Association, for example, suggest an approach to sustainable development that differs considerably from the common concepts based on the trinity of ecology, economy and social aspects, even though the HGF model acknowledges the three dimensions and adds institutions/politics as a fourth dimension. The basic elements of the HGF concept are inter- and intragenerational justice, globalism and anthropocentrism. The superior goals based on those elements are “assuring human existence, conservation of societal production potential and the preservation of the possibilities for development and action” (HARTMUTH 2004). The depiction of the concept is derived from the circle models of sustainability, but is complemented by a timeline and a geographical axis (cf. Figure 11).

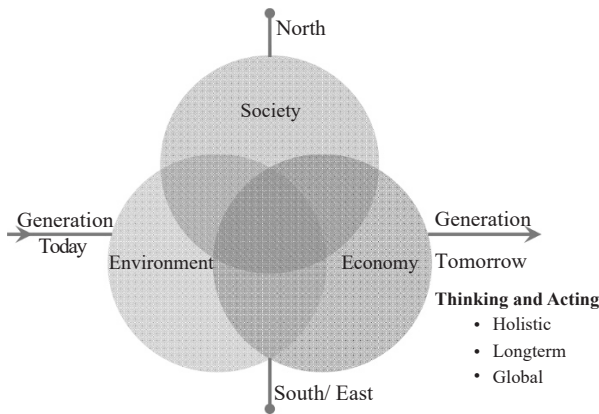


Figure 11: Integrative sustainability concept of the HGF

(KOPFMÜLLER 2011, P. 8)

As can be seen in, the basis for the HGF concept is the circle model of sustainability, supplemented by a North-South/East axis and another axis illustrating the different generations. This integrative concept leads to the development of an indicator set for sustainable development. Based on the determination of central sustainability problems and a thorough definition of the concept “sustainable development”, its general objectives, minimum requirements and rules, indicators to evaluate sustainable development are compiled (cf. Figure 12). The authors participating in the project aim to find an integrated concept that analyses strategies and measures not as isolated facts for each dimension, but rather interdisciplinary (DIEFENBACHER ET AL. 2009).

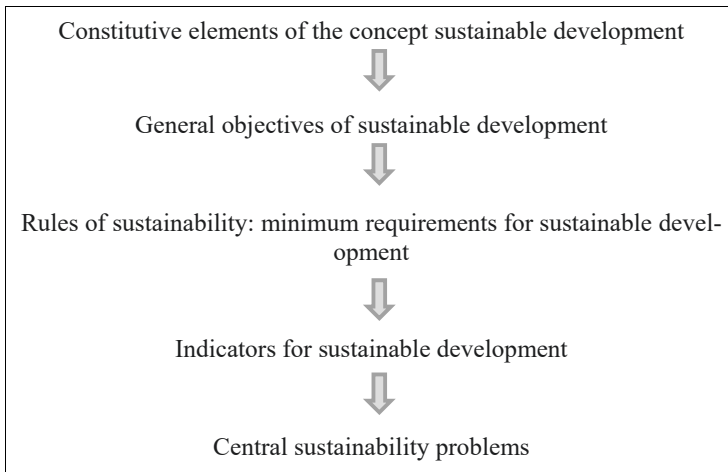


Figure 12: HGF concept for sustainable development indicators
(HARTMUTH 2004, p. 7)

2.7 The Dimensions of Sustainability

Depending on the concept of sustainability followed, the dimensions are considered equal or the ecological dimension is given precedence. For a thorough understanding of sustainability, it is necessary to understand the dimensions and the corresponding policy areas.

There are many fields of politics. On every level (global policy, continental policy such as EU-policy, national policy, regional policy or local policy), the fields differ a little from those on other levels, for example in the responsibilities of the ministries or because the competence for certain fields is on a different level¹⁵. But all in all, the main fields of politics are similar for most levels and regions, even though the importance placed on a specific field will sometimes differ significantly according to the individual situation of the country or region. Figure 13 shows an example of possible political fields and the dimension of sustainability they belong to.

¹⁵ Foreign and security policy, for example, are usually only conducted on a national (or, in some cases an international) level, while cultural policy, school policy or transportation policy can also be found on lower levels.

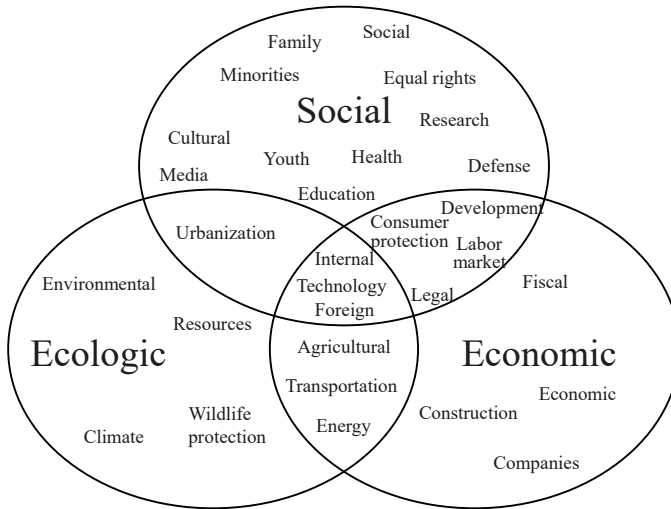


Figure 13: Policy fields

(author's own)

It is likely that the list is incomplete, and the fields mentioned are of different importance. It must also be taken into account that most areas are somehow related to all dimensions of sustainability. To provide an overview and to contribute to a better understanding and classification of policy fields and the sustainability dimensions, policy fields are assigned to the dimension they mainly affect. The dimensions shall be discussed in detail in the following subsections.¹⁶

2.7.1 The Ecological Dimension

The ecological dimension is what usually comes to mind first when sustainability is mentioned. This is partly due to the fact that the original sustainability models were based mostly on the ecological aspect, but also because public understanding of sustainability is very closely linked to this dimension. A 2012 survey by FORSA, a German

¹⁶ It is not the aim of this chapter to provide a comprehensive overview over the current state of sustainable development within each dimension. This would stray too far from the focus of this work, but is likely also impossible, as success and failure within the dimensions are hard to measure, but also too diverse within countries and regions. The discussion for the ecological dimension in Germany has been extensive as can be seen in various publications of the SRU (2002, 2012) or the WGBU (2011).

institute for social research, among citizens showed that they estimate the importance of actions to further sustainable development with a clear bias towards environment-related topics (FORSA 2012). This domination of the ecological dimension over the others is welcomed by many politicians and researchers who claim that such precedence of this dimension is imperative due to the irreparable damage that already occurred (HAUFF, JÖRG 2013). Environmental problems have considerable influence on economic and societal development; therefore a priority for decelerating climate change during a transformation towards a sustainable society seems the only logical solution (WGBU 2011). The economic costs for respecting the ecological limits may be very high, though, rendering the reparation of the environmental damage rather unlikely if the costs are considered unacceptable (COSTANZA ET AL. 2012). When talking about the ecological dimension of sustainability it is necessary to distinguish between political measures to further ecological sustainability and traditional concepts of environmental protection. While the latter's approach is to consider the protection of the environment as an objective to be pursued, the sustainability approach considers ecological sustainability one of many aims within the general principle of sustainability. Environmental protection is therefore rather a necessity to reach the overarching aim than the aim in itself. It is argued that ecological sustainability is a function for the furthering of social and economic development, thereby indicating that the limits of growth are not set by the environment but rather by the state of scientific and technical knowledge and the social organization thereof (BRAND, JOCHUM 2000). Often cited ecological aims are:

- (1) Protection of earth's atmosphere
- (2) Protection of the ecosystem
- (3) Protection of resources
- (4) Protection of human health
- (5) Mobility within in the limits of the environmental space (ROGALL 2007).

To realize those aims is the explicit assignment of environmental institutions and laws; and rules and regulations have to be shaped accordingly. Their extent, but more importantly their enforcement, varies greatly among the nations.

When putting the ecological dimension in context with the sustainability concept, the distinction between strong and weak sustainability (cf. subsection 2.5) needs to be considered. Strong sustainability would imply a precedence of the ecological dimension, as it would prohibit the use of exhaustible resources, thus restricting the social and economic dimensions. Weak or balanced/reasonable sustainability would allow equality between the dimensions. The requirements of a sustainable policy for both cases would differ in the permission to use exhaustible resources, but would be equal in permitting emissions (which must be below the level of maximum assimilation of the medium they are put into) and the use of renewable resources, if the extraction rate

is lower than the potential regeneration (cf. Figure 14). The latter provides another difference between the weak and the strong concept. Weak sustainability would allow the use of renewable resources even above the possible regeneration rate, as long as substitution is guaranteed.

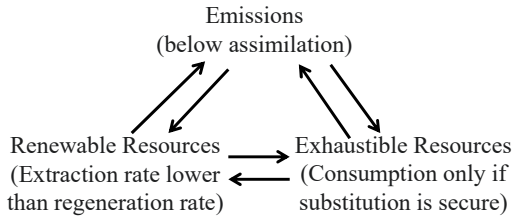


Figure 14: Connections between emissions and resources

(HAUFF, SCHIFFER 2013)

It has been discussed above (cf. subsection 2.5) that strong sustainability is unlikely to be realized, as it could not be enforced. Therefore, policy makers who choose either weak or balanced sustainability as their general principle also need to make assumptions about technological development and the existence of possible substitutes and choose their policy measures accordingly. Their assumptions, the resulting types of ecological policy and the results if the assumptions are right or wrong can be illustrated in a payoff matrix (cf. Figure 15). If a policy maker is optimistic about the development of substitutes for natural resources and chooses an optimistic type of policy that supports research and development (R&D) for substitutes for natural resources and at the same time allows the use of exhaustible resources as well as the overuse of renewable resources¹⁷, then the outcome of this policy depends on the accuracy of the assumptions. If the assumptions were correct, the rewards for the measures will be high, i.e., the policy measures taken were an important step towards sustainability. But if the policy maker is wrong and the optimistic policy of overusing resources is not met with the necessary technological development to provide substitutes, then the result is disastrous for the goal of a sustainable world. At the same time, if a policy maker assumes a more pessimistic view towards the development and chooses the policy measures accordingly, not allowing the use of exhaustible and the overuse of renewable resources, and the assumptions are correct, then the outcome will be tolerable. There will be no regress in sustainable development. In case the policy maker's assumptions were wrong and technological development was more successful than expected in finding substitutes for natural resources, then the payoff will not be as high

17 *Overuse* refers to using more of the resource within a certain period of time than can be regenerated, thus depleting the stock of the resource.

as in the optimistic assumptions and policy/optimistic outcome scenario, but still positive.

		Actual state of the world	
		Optimists about technological development and possible substitutes for natural resources are right	Pessimists about technological development and possible substitutes for natural resources are right
Type of policy	Optimistic	High	Disaster
	Pessimistic	Moderate	Tolerable

Figure 15: Approaches to environmental uncertainty

(PEARCE ET AL. 1989)

Assumptions must also be made about the characteristics of the ecological systems that are relevant for a specific decision on policy measures. There are five possible characteristics: persistency (system is sustainable over time), constancy (system stays in status quo independent of external influences), resistency (system remains in equilibrium and withstands external disruptions), elasticity (system returns to status quo after strong external disruptions) and resiliency (degree of external disruptions a system can withstand and speed with which it returns to status quo afterwards) (DIEFENBACHER ET AL. 2009). If the policy makers assume a system to be sustainable over time, very elastic, constant, resistant and resilient, they will tend to make their decisions rather independent of possible environmental impact.

One of the problems of such assumptions and the decisions based on them is that the outcome will only be visible long after the decision is made. Therefore, a repetition of the decision process and the following choice of policy measures may be possible, but not within a short span of time. This would imply the need for a thoroughly informed decision, but, as will be discussed in subsection 3.3, as policy makers will most likely not face the results of their decisions and therefore not be punished for possible wrong decisions, they do not necessarily make prudent choices, but rather decide on those types of policy that will yield the highest agreement in society in the short run, and therefore the most votes¹⁸.

18 As will be discussed in subsection 3.3, there are of course those decision makers that are not interested in their reelection, but rather in realizing the ideal of a sustainable development. But as those idealists can also only achieve their goals if they get enough time and power to do so, they still depend on votes and possibly on reelection.

There are different approaches to measure the status quo and the development of the ecological situation. There are single indicators provided by the statistical offices of various countries and institutions, but also aggregated indicators such as the Happy Planet Index as a complete sustainability index or the ecological footprint as an index for the ecological dimension of sustainability. The advantages and disadvantages of single and aggregated indicators will be discussed in detail in chapter 3, at this point of the work it suffices to present some data.

The ecological footprint is a measure to calculate environmental impact. It is a metric measure of the amount of land required to sustain a country's consumption, including the area to (re)produce the renewable resources that are used by a country's citizens, the area that is used for the country's infrastructure, and the area that is required to absorb the country's CO₂ emissions. It is measured in global hectares (gha). A combination of biocapacity data with the current global population yields the upper limit of gha that could be consumed if the consumption is to be sustainable. This limit has been calculated at 1.8 gha per capita for the current generation. The countries with the worst ecological footprint p.c. are Qatar (11.7 gha p.c.), Luxembourg (10.7 gha p.c.) and Kuwait (9.7 gha p.c.); the countries with the lowest ecological footprint per capita are Bangladesh, Haiti and Afghanistan, all three with an ecological footprint of less than 1 gha p.c. Germany has an ecological footprint of 4.6 gha p.c. (NEW ECONOMICS FOUNDATION 2012).

There is a strong correlation between p.c. GDP and ecological footprint; the explanations for this correlation being obvious (cf. Figure 16).

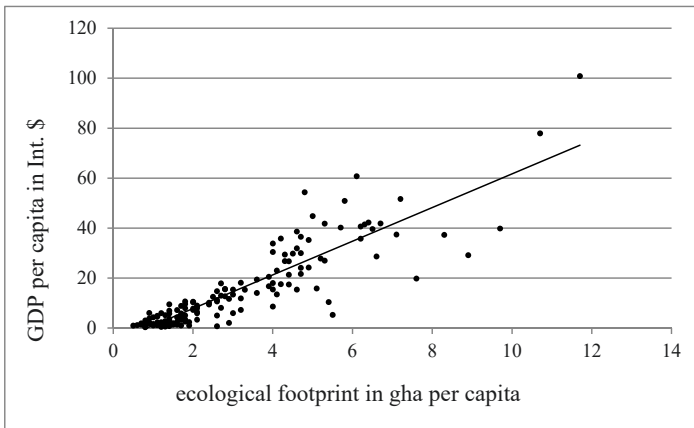


Figure 16: Ecological footprint and GDP

(author's own, data from NEW ECONOMICS FOUNDATION (2012), INTERNATIONAL MONETARY FUND (2012), trend line OLS-estimation, $R^2 = 0,778$)

The implications for sustainability are quite discouraging: if the correlation between the ecological footprint and GDP per capita is – and remains – positive, realizing intragenerational justice will lead to an increased GDP for poorer regions, but also to a growing ecological footprint. The alternative would be to either reduce GDP for the developed countries and to hope to thereby reduce their ecological footprint – a measure that will most likely not find any political majority – or to develop technologies and adapt lifestyles to break up or lessen the correlation between GDP and ecological footprint. The GLOBAL FOOTPRINT NETWORK (2015) estimates that current resources use would need 1.5 planet earths. When forecasting future resource use based on moderate UN scenarios on consumption, demographic development and estimated growth of crop yield, the current resource use would require two planets by 2030.

The German Network for Sustainable Economics set a number of ecological management rules that must be followed if sustainability is to be realized (cf. Figure 17). The first rule, climate protection, refers to the requirements shown in Figure 14. Emissions must not be higher than maximum possible absorption, thereby protecting the climate. The second point stresses the fact that human interference into environment must allow for enough time for nature to self-stabilize. The third rule refers to another aspect discussed in Figure 14, the requirement that renewable resources must not be used above their rate of regeneration (this requirement is objected to by advocates of weak or balanced sustainability, cf. subsection 2.5). The same holds for rule four, also disputed between advocates of the different specifications of sustainability. The last rule aims at the humans' quality of life, but also the environment, asking to restrict pollution, radiation and noise. This rule also demands the consideration of the impact of political and economic decisions on human health, the environment and the quality of life (NETZWERK NACHHALTIGE ÖKONOMIE 2012b).

- (1) Climate protection
- (2) Environmental compatibility, protection of species, protection of landscape diversity
- (3) Sustainable use of renewable resources
- (4) Sustainable use of non-renewable resources
- (5) Healthy living conditions

Figure 17: Ecological management rules

(NETZWERK NACHHALTIGE ÖKONOMIE 2012b)

2.7.2 The Economic Dimension

The economic dimension of sustainability is complex and there are quite a few disagreements between the parties involved in the discussion. To define rules of economic sustainability, authors use different approaches. DALY (2007b)¹⁹, for example, assumes that “the economy is a subsystem of the larger ecosystem, and the latter is finite, non-growing, and materially closed”, thus claiming that the economic dimension is subordinate to the ecologic dimension. He is supported by von HAUFF and SCHIFFER (2013) who state that the economic and social system cannot be sustainable in themselves. They need a certain quality and stability of the ecological system to work, therefore, stakeholders’ adaption to the resilience of nature is necessary. The alternative to this approach is offered by the representatives of the sustainability models claiming equality for the dimensions.

A specific of the economic column is the creation of value, which is not necessarily limited by the laws of nature, as natural input is combined with knowledge. Therefore, the criteria for economic sustainability have to include not only physical capital and natural resources, but also human capital and technical and organizational knowledge (sometimes summed up as social capital). But apart from some general rules like the preservation of assets, criteria suggested differ widely, mostly based on different assumptions regarding factor mobility (BLAZEJCZAK, EDLER 2004). The German Network for Sustainable Economics developed a set of economic management rules to comply with the requirements of a sustainable development (cf. Figure 18).

- (1) Consideration of economic consequences
- (2) Guarantee of fulfilling basic needs with sustainable products
- (3) Prices have to be appropriate and fulfill a controlling function
- (4) Balance in foreign trade with high self-sufficiency
- (5) A functioning budget with an adequate endowment with merit goods

Figure 18: Economic management rules
(NETZWERK NACHHALTIGE ÖKONOMIE 2012b)

The first rule sounds simple but has not always been followed to date: that one has to consider the economic consequences of economic actions. The second rule, the guar-

19 Herman Daly is one of the Founders of the International Society for Ecological Economics and can be counted among the advocates for the precedence of ecology.

antee of fulfilling basic needs with sustainable products, means that individual and societal needs must be fulfilled efficiently, but within ecological limits. Therefore, economic policy must encourage all innovations and changes towards sustainable production. The appropriateness of prices means that they have to include externalities. The balance in foreign trade is a common requirement, but the sustainable addition is that goods are only exchanged if they cannot be produced efficiently (i.e., if internalizing all externalities the foreign goods are still cheaper or better) within the country. This would also reduce economic dependency on other countries. The last rule, a functioning budget, is also extended with the demand for an adequate endowment with merit goods. That means that the functioning budget has to go hand in hand with sufficient collective and merit goods to improve education and human capital, among others (NETZWERK NACHHALTIGE ÖKONOMIE 2012b). To fulfill those requirements, three main actors within this dimension have to be taken into account: the government/politics, companies and consumers.

2.7.2.1 Politics

In Germany, the political basis for the economic dimension is the so called *magical square*. The German Stability Law demands in its §1, that all economic and fiscal decisions must be made so that they simultaneously contribute to the stability of the price level, high employment, balance in foreign trade and steady and adequate economic growth (STABG). The fiscal and expense topics have been given a de facto antecedence by the inclusion of the brake on debt into the German Constitution and the European fiscal pacts. To comply with those rules, it may be necessary to neglect or even disregard the other dimensions of sustainable development, thus giving the economic sector precedence (DULLIEN, VAN TREECK 2012).

As much of the German economic and monetary policy is interdependent with the European market and politics, it has to be kept in mind that the BUNDESBANK, for example, has not much influence on the stability of the price level anymore, because the potent instrument of monetary policy has been given up in favor of the European Central Bank (ECB). It has often been suggested to extend the *magical square* to a pentagon or hexagon with the additional corners social justice, livable environment or just distribution of income and wealth, as the traditional magical square does not meet the requirements of the current environmental, economic and social situation. Some authors go one step further and suggest the adjustment of the objectives. DULLIEN and VAN TREECK (2012), for example, suggest the following goals for economic policy: material well-being, provided by a moderate economic growth; ecological sustainability to ensure that natural resources are not endangered in the long run; social sustainability to avoid/reduce social inequality and sustainable public policy and public finances to secure the public capital stock for future generations. The latter three points are largely derived from the established definitions of sustainable development, but the suggestion also recommends „moderate economic growth“ as a measure towards sustainability, a

characteristic that is increasingly disputed. In this context it is used to provide material well-being, but as the welfare of citizens is increasingly uncoupled from economic growth (HAUFF, SCHIFFER 2013), at least in societies where a certain level of economic well-being has been reached, it is arguable whether economic growth should be an important political aim for industrial nations at all. For developing countries, the exclusion of growth and wealth in the measurement or evaluation of sustainable measures is hypothetical. If intragenerational justice and the meeting of basic needs are declared aims of sustainable development, then countries where economic growth is essential to fulfill those basic needs will necessarily concentrate on economic growth. In any case, the association of growth with economic topics is a very common one. For many, economic growth and material well-being are almost synonymous with overall well-being. As sustainability is often defined as necessity to ensure current and future generations' well-being, a short discussion of well-being will follow in subsection 5.7.

2.7.2.2 Consumers

The consumers are an important factor in the course of sustainable development. For one, consumers are also voters. If they do not agree with the politics suggested by the ruling parties, they may well punish them in the next election. As politicians need to be elected to realize their ideals and goals, they are likely to adjust their suggested measures to the extent that is just acceptable to the voters. The beliefs and convictions of voters are often investigated. A 2012 poll found, for example, that of about 1.000 people interviewed, a vast majority (84%) believed that stronger economic growth is possible while protecting the environment and ensuring sustainability (cf. Figure 19).

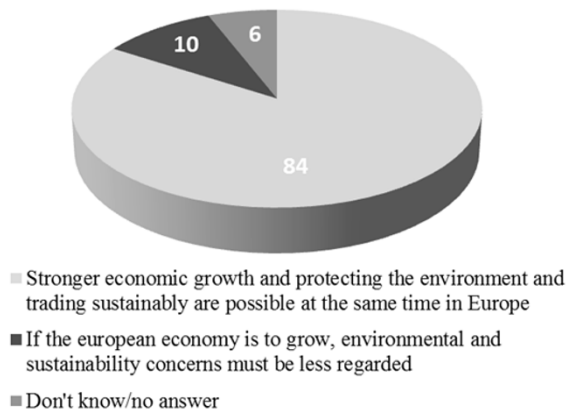


Figure 19: Compatibility of economic growth and sustainability
(TNS EMNID, BERTELSMANN STIFTUNG 2012)

Only 10% of the interviewees believe that for the economy to grow, it is inevitable that environmental protection and striving for sustainability must be neglected. As most scientists lean toward the latter assumption, this is another proof of the necessity of sustainability education among the general public in order to further the understanding of the meaning and also the implications of sustainability and sustainable development.

To realize sustainable development it is also imperative that consumers change their consumption patterns towards the sustainability paradigm. The consumption of products harmful to the environment must be reduced and consumers must be more alert and informed about the goods they consume and their environmental impact (GEYER-ALLÉLY, EPPEL 1998). PAECH and PFRIEM (2007) see this as a crucial aspect, but stress that especially in developed nations, consumption is not necessarily used as a means to satisfy needs, but that companies aim to create (imaginary) needs that can be satisfied by their products. Consumers need to be aware of the influence of companies' marketing on their wishes and presumed needs and make conscious decisions to avoid overconsumption. In addition, as consumers are usually also voters, they need to inform themselves (and be informed) about pressing issues that should be tackled on a way towards a sustainable society. Current studies show that economic problems for example are considered by far more important than environmental topics (cf. Figure 20).

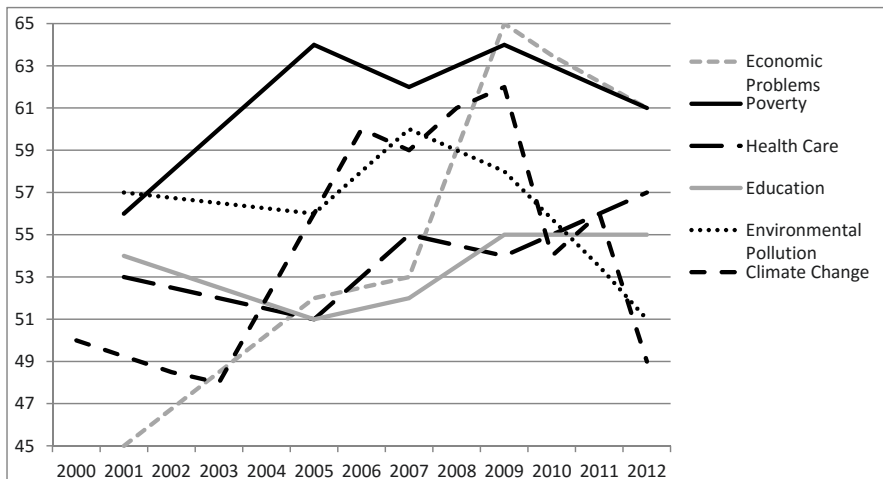


Figure 20: Importance of future challenges

Survey 2000 – 2012, answers “very serious challenge”, average of 14 countries (Brazil, Canada, China, France, Germany, India, Indonesia, Kenya, Mexico, Nigeria, Spain, Turkey, UK, and USA) (GLOBESCAN/SUSTAINABILITY 2012c, p. 7)

It is also interesting to note that the estimation of the seriousness of economic problems has grown considerably over the last decade, while environmental pollution and climate change are becoming less important. This may, at least in part, well be a consequence of the selection of interviewed persons because, as mentioned before, the importance assigned to different topics varies greatly between emerging and industrialized countries. As the data set includes developing as well as developed countries, though, the results cannot simply be dismissed on grounds of an insufficient choice of countries in the sample, but provide a relevant insight.

These results give important hints for policy makers trying to establish sustainable development as the leading paradigm all over the world. No matter whether one leans towards sustainability definitions with equal importance for all dimensions or towards a precedence of the environmental pillar, it is necessary to convince people of the damage that may be done if short-term economic growth is given pre-eminence before environmental concerns. A possible strategy to include the consumers in the process of realizing sustainable development is described by OTT and DÖRING (2007), who suggest to adapt the guiding principle and the according measures to the different social milieus such as those suggested for Germany in the renowned study of the SINUS-Milieus (2013), where ideals and moral concepts of citizens are evaluated and classified.

2.7.2.3 Companies

First and foremost, companies will adapt their production, if a) government rules and regulations force them to and b) if customers demand it. In the last years it has become more common to declare Corporate Social Responsibility (CSR) or Corporate Sustainability (CS) their guidelines. Both are voluntary guidelines that exceed legal obligations with which companies aim at a more responsible production. CARROLL (1991), for example, describes a company's situation as a triangle (cf. Figure 21).

The basic necessities for a company are to be profitable (= economic principle) and to act lawfully (= legal principle). If those necessities are fulfilled, a company can add ethical and eventually philanthropic issues to its strategies. Those two latter aspects are not required to run a company, but as customer awareness of ethical and social issues is growing, it may well be advantageous the company's sales to include those topics into their strategies. The ethical dimension includes the obligation to avoid harm, the philanthropic dimension adds the responsibility to improve the quality of life and contribute resources to the community (KAS 2012). In current discussions about CSR, the economic, legal and ethical dimensions are rather understood as integrated than as separate dimensions that must somehow be mentioned in the company's strategies. Instead, CARROLL and SCHWARTZ developed a circle-model for the core dimensions of a CSR that is integrative and offers the options to place the company's strategy on any

combination of the three dimensions (cf. Figure 22). In this model, the philanthropic responsibilities are not included anymore.



Figure 21: Pyramid of CSR
(CARROLL 1991)



Figure 22: Core dimensions of CSR
(SCHWARTZ, CARROLL 2003)

Companies have reacted to customer's growing interest in sustainable products and services. They are increasingly informed about social and environmental standards and expect companies to adhere to those standards²⁰. Starting with standards for organic food and various ecolabels, a large number of certificates and standards exist now. Some of these standards have been developed by individual companies, but many have been launched by NGOs or social movements supported by NGOs. Many of the standards and certificates are specifically for the food industry. In addition to purely product related labels ("bio"/"organic" food), there are also labels that evaluate the production process (e.g., the working conditions, transport, etc.). Those labels can be considered labels that evaluate sustainable development, as they include the different dimensions.

Apart from the food-industry labels, a number of other standards and certificates have developed. Institutions such as EUROSIF, the European Sustainable Investment Forum, or its members such as the FNG, the German, Austrian and Swiss Sustainable Investment Forum, aim to further sustainable development through the financial markets. The DJSI (Dow Jones Sustainability Indices) for example are considered a global sus-

²⁰ A number of studies have been conducted to prove that customers "punish" companies that are not perceived as responsible and sustainable. One of those studies is the Global RepTrak 100 Study that measures how the 100 most highly regarded companies across 15 countries are perceived and how customers react to that perception in terms of purchases (REPUTATION INSTITUTE 2013).

tainability benchmark, but apart from the global comparison, they also offer regional analyses²¹. In Germany, for example, the German Association for Financial Analyses and Asset Management (DVFA) develops key criteria to assess companies, including ecological, social and governance indicators. Most of the sustainability indices include more than 100 single indicators for every company, thus enforcing a weighting and the setting of priorities.

To achieve good results in those sustainable company rankings, companies need to set up sustainability strategies as mentioned above. These strategies should include cooperations with other stakeholders in sustainability. But while sustainability experts believe that in respect to sustainable development policy, the most effective approach for companies is to work with multi-actor collaborations, including government (58%), only 30% of the experts think that this is the approach that companies are most likely to take according to a 2012 survey among development experts and practitioners from all sectors involved²² (GLOBESCAN/SUSTAINABILITY 2012a). It is also advocated that companies should be included in mapping out ways to sustainable development as their collaboration is crucial; most of them doubt the approach taken by the companies so far (GLOBESCAN/SUSTAINABILITY 2012a). The experts were asked whether individual direct action or collaboration with multiple actors were most effective for multinational companies aiming to achieve positive results with regards to sustainability. They believed that most actions should involve collaboration with multiple actors, even elementary company internal options like engaging the employees on sustainability issues or the development of sustainable products or services (GLOBESCAN/SUSTAINABILITY 2012a).

Another important part of economic sustainability is the labor market. This field is not only relevant for the economic, but also the social dimension (cf. subsection 2.7.3). In the 1990s, companies considered the environment as an important factor for location decisions. Environmental laws and regulations were considered an obstacle for the decision. At the same time, the quality of the environment was regarded a soft factor, especially important to attract employees (GRABOW ET AL. 1995). If the protection of the environment is seen as killing jobs that means there is a trade-off between the ecologic and economic and social dimension (PETSCHOW ET AL. 1998). Following this train of thought, companies would be located in those places where the balance between high costs for compliance with environmental regulations and an environment that attracts qualified labor was even. Current theories of economic geography lean more toward

21 The DJSI, a group of indices that evaluate the sustainability performance of companies listed on the Dow Jones Index, are offered by RobecoSAM Indices and S&P Dow Jones Indices and partly use the data of the conventional Dow Jones with added environmental and social criteria.

22 The sectors involved are “corporate, government (including multi-lateral institutions), NGOs, Institutional (e.g., academics) (and) Service (e.g., consultants, media)” (GLOBESCAN/SUSTAINABILITY 2012a).

behavioral theory²³ and Krugman's new economic geography²⁴, and do not place the same importance for location decision on environmental costs for the companies anymore.

Another economic factor are jobs in green sectors. They have become more numerous as the importance of environmental friendly production has grown. It has been found that employees have reported increased job satisfaction working for companies that embrace or promote sustainability principles (JANN ET AL. 2006).

2.7.3 The Social Dimension

It has been mentioned before that the economic and social system cannot be sustainable in them, but instead need a certain quality and stability of the ecological system to work. Some scientists claim that the social dimension is usually not only dominated by the ecologic dimension, but by the economic one as well, thus leaving the social aspects a subordinate position (EBRINGHOFF 2005). This position is also supported by HOLSTEIN (2003) who states that social sustainability cannot be realized unless the economic and ecologic requirements are met.

The social dimension is also often considered a special challenge as social capital is not as clearly defined as ecological and economic capital. It is sometimes described as the structures underlying production such as public institutions; newer definitions include the possibility to satisfy needs, to realize social integration and to advance a society (HAUFF, KLEINE 2009). It must be kept in mind, though, that social sustainability is always defined in the context of the situation it is used in and that in praxis, the realization of social sustainability is usually rather based on ad hoc decisions than on a sound concept. MUTLAK and SCHWARZE (2007) therefore state a deficit in the development of theories on the social dimension. The aims that are usually attributed to the social dimension of sustainability are

- (1) social security
- (2) democracy and rule of law
- (3) inner and outer safety (peace)
- (4) social integration and equal life chances (including gender equality)

23 The inclusion of behavioral theory in location theories supports the assumption that entrepreneurs have not only economic, but also other goals and will therefore often accept locations or strategies that are not optimal in the strict economic sense.

24 KRUGMAN was the first who, in the 1990s, developed a new approach to economic geography. In his theory, he includes factors such as economies of scale, external effects and others. Thus, he supports the theory that location decisions are not solely based on a strict calculation of location costs.

(5) quality of life and health (ROGALL 2007).

Similarly, LAMPERT AND ALTHAMMER (2001) offer an assignment of political areas to social policy that shows, which areas of life are touched by the social dimension (cf. Figure 23). International and supranational social policy can be roughly divided into the same areas, although many of the social policy decisions are still made on a national level, so the supranational social policy has been neglected in the depiction.

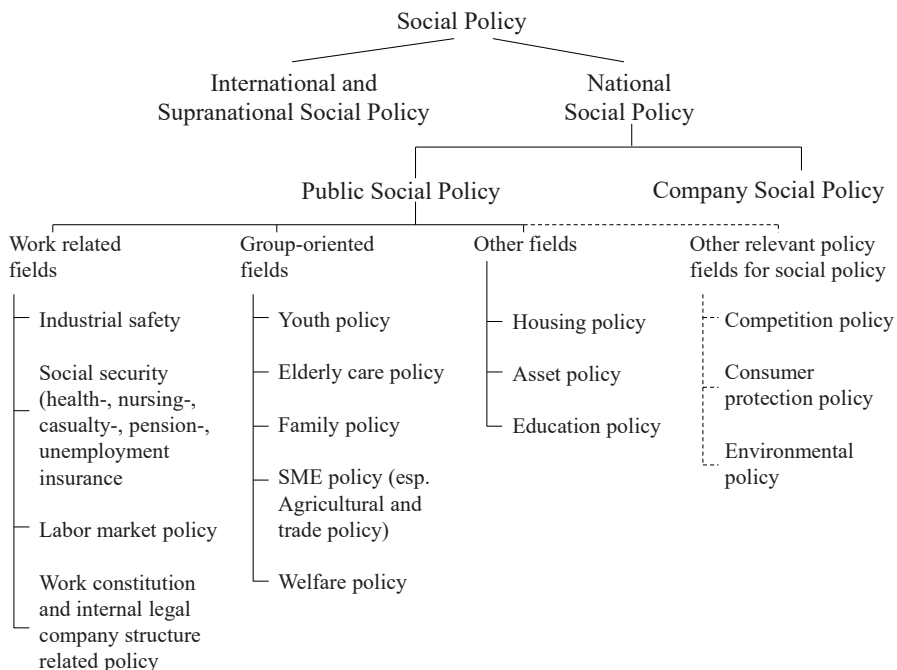


Figure 23: Areas of social policy

(LAMPERT, ALTHAMMER 2001, p. 159)

Education in all its forms – schooling, training for a job, but also lifelong learning – and access to culture (often defined in a broader sense, including art and literature, but also forms of life, basic rights, value systems, traditions, etc.) are especially important for reaching social sustainability (HAUFF, SCHIFFER 2013). In many countries education is seen as a very serious challenge to society. A GLOBESCAN/SUSTAINABILITY survey from 2012 shows that in many countries, education is seen as one of the most important challenges to society.

Interestingly, when those survey results are plotted against the GDP purchasing power parity (PPP) per capita there is no clear correlation between the estimated importance of the educational challenge and p. c. GDP²⁵ (cf. Figure 24). There are several ways for education to have impact on sustainable development. Education increases human capital, thus influencing the economic dimension of sustainability by furthering economic growth and (sustainable) innovations. The social dimension is influenced as well, as a better education leads to a sensitization for sustainability problems (GRUNWALD, KOPFMÜLLER 2006).

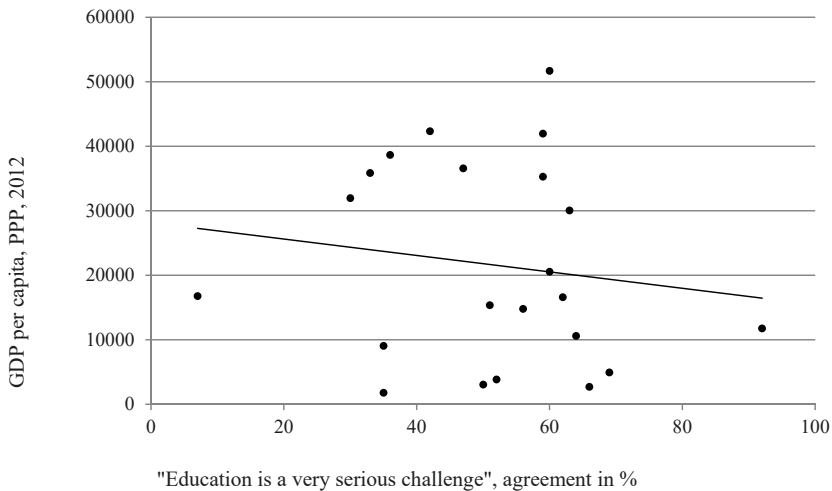


Figure 24: Challenges to society: education and GDP

(GLOBESCAN/SUSTAINABILITY 2012c; IMF 2013), trend line OLS estimate

The labor market, an important part of the social dimension, influences the social dimension of sustainability in various ways. For one, employees (and employers) pay taxes, thus financing the public system. Having a job also is important for welfare as will be further discussed in subsection 4.1 and for overall social cohesion. Jobs and labor are concerned in many fields of social policy (cf. Figure 23); among them all directly work-related areas, but also in youth and family policy, or policies for small and medium enterprises (SME). Education policy is linked with the labor market, as are

25 The OLS estimate yields an insignificant negative correlation with an R² of 0,021. This correlation can therefore be neglected.

competition and environmental policy. Many political decisions to be made influence the labor market directly or indirectly, either immediately or with an impact in the long run. The labor market is only indirectly regarded by the generational balance, though. The sustainability gap used as an indicator of the sustainability of the social sector and the expenses of the government²⁶ indicates that economic booms in the last decade did not result in an improved sustainability gap (RAFFELHÜSCHEN ET AL. 2007). It shall be discussed in subsection 4.4, whether inter- and intragenerational justice is aspired to in labor market policy decisions. A 2012 survey among sustainability experts showed that RAFFELHÜSCHEN'S opinion is supported by many of his colleagues. When asked about the worlds' progress on economic, environmental and social causes, the experts assert that there has been progress in the first two areas, but regress in rising to the social challenges (GLOBESCAN/SUSTAINABILITY 2012b).

As for the economic dimension of sustainability, the network for sustainable economics developed a set of management rules to follow if social sustainability is to be realized (cf. Figure 25).

- (1) Good Governance
- (2) Social security, no poverty
- (3) Equality of opportunities, social integration and distributive justice
- (4) Conflict avoidance
- (5) Techniques without risk

Figure 25: Social-cultural management rules
(NETZWERK NACHHALTIGE ÖKONOMIE 2012b)

The good government targets corruption, the abuse of power, short-term management and other destructive and undesirable policy influences. It is imperative that democratic and constitutional rules are observed; and market failure has to be corrected by the state. Point two of the social-cultural management rules asks that every member of society receives benefits from the social systems according to his or her contributions or corresponding to their need. The authors stress, that to be sustainable, those benefit may only grow with the extent of economic productivity and all members of society must contribute according to their abilities. Equality of opportunities, social integration and distributive justice have to be ensured by policy makers, who also need to make

26 The sustainability gap is an extended version of the debt-to-GDP ratio. It does not only include the explicit national debt, but also the implicit debt that will be incurred in future years (MOOG, RAFFELHÜSCHEN 2013).

sure that those requirements can be fulfilled for current and future generations while respecting the limits of natural capacity. The fourth rule, conflict avoidance, refers to an avoidance of any policy that could destabilize international security; the fifth rule forbids the use of technologies that involve unjustifiable risks.

2.8 Summary

In this chapter, a short overview over the evolution over the general principle of sustainable was given. Based on the insights gained at each milestone of the development, definitions of sustainable development were reviewed. As the definitions are only a vision, and realization of the idea needs concrete requirements, the transfer from the general idea towards a concept was described and the minimum requirements for the realization of the concept discussed. The most common definition of sustainable development includes an underlying stipulation of intra- and intergenerational justice. These two concepts were analyzed, especially with regards to the meaning of justice and fairness. The quantification and various methods to calculate intra- and intergenerational justice were surveyed. Taking into account the necessity of assertive institutions to ensure the implementation of sustainability strategies on all levels of society, institutions to further sustainable development are then discussed.

Those introductory topics were followed by a discussion of the possible characteristics and a specification of the ecological, economic and social dimension of sustainable development, including an analysis of the stakeholders, especially in the economic dimension. The concluding subsection summarizes the chapter by attributing possible sustainability models and depictions to the changing understanding of sustainability in the last decades and thereby showing the complexity of the general principle.

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