

Adina-Roxana MUNTEANU  
The Bucharest University of Economic Studies

# THE ETHICAL LAYER OF SUSTAINABLE DEVELOPMENT

Literature  
review

---

## Keywords

Sustainable development  
Environmental Ethics

---

## JEL Classification

Q01

---

## Abstract

*Working with the Brundtland definition of sustainable development, this article aims to shed some light on the ethical choices that are implied and raised by this concept and attempts to sketch the main ideas of the ecological ethos of the global community. In essence, this article argues that the adoption and implementation of the concept of sustainable development implies an ethical package that needs to be understood, assumed and adapted by the stakeholders that define and enact implementing measures. With the intent to clarify some of the ethical assumptions, such as value of nature, the precautionary principle and intergenerational equity, the article reviews some important points of the discussions on various standpoints of the ongoing debates. Even though the ethical standpoints are by their nature a personal choice of each of us, they have an impact at a larger, arguably, global scale.*

## 1 Introduction

Whenever talking about sustainable development, the widely acknowledged Brundtland definition is a reference: “*Sustainable development is development that meets the needs of the present, without compromising the abilities of future generations to meet their own needs*” (WCED, 1987).

Starting from this definition we can start to unfold the meaning of the concept. Looking in more detail, the ethical implications of this definition are revealed, as they are embedded in the economic, social and environmental aspects of sustainable development. What is more important is that the decisions that need to be made in order to implement the concept of sustainable development also imply ethical positions.

Since the issuing of the definition of the Brundtland Commission, several tens of other definitions have been proposed by scholars and practitioners in order to transform the concept into an operational reality. In 2007, there were catalogued around 300 alternative definitions and variously modified definitions of “sustainable development” (Santillo, 2007). However, a clear meaning is still intangible. Moreover, sustainable development still means different things to different stakeholders.

One rather obvious and superficial connotation of sustainable development refers to a development that is continuous, that can be sustained indefinitely. This sense is somewhat trivial and contradictory at some level, leading to various critical comments and to some people considering the idiom of “sustainable development” an oxymoron (Santillo, 2007).

However, the concept of sustainable development aims to incorporate not just the traditional objectives of economic growth but also the ecological and social ones. The report of the Brundtland Commission states that human needs are basic and essential and that economic growth is to sustain these needs but in a context of equity and sharing resources with the poor.

In a study made by the Board on Sustainable Development of the U.S. National Academy of Sciences, *Our Common Journey: A Transition toward Sustainability*, the authors clarify what the sustainable development concept implies the “what is to be sustained” and “what is to be developed”. Thus *nature* (meaning the earth, biodiversity and ecosystems), *life support* (referring to ecosystem services and resources) and *human communities* (including the culture, groups, and places) are to be sustained. In addition *people* (meaning life expectancy, education, equity, and equal opportunity), *economy* (referring to wealth, productive sectors, consumption) and *society* (implying institutions, social capital, states, and regions) are to be developed (NRC US, 1999).

## 2 The Ethical Standpoints of Sustainable Development

Before presenting the main discussion points of this article, some clarifications are due regarding the concepts that are used throughout the following paragraphs and also some of the assumptions the author operates with in arguing the main points.

First of all, the concept of ethics needs clarification. This article operated with the concept of ethics as it is the branch of knowledge that deals with moral principles that govern a person's behaviour or the conducting of an activity. Moreover, ethics tries to establish a set of rules to determine what can be viewed as “good” or “bad” behaviour. However, as there is no universal “right” or “wrong”, there is no universally accepted code of ethics.

Starting from the premises of a relative truth, one then must always raise the question “right for whom? Wrong for whom?”. The rights and wrongs are usually defined by an individual's morals. As the moral code of a certain community naturally evolves in time and space, according to the dynamics of the cultural background and the specific situation of the involved groups of people, the definitions of right and wrong also change over time and across different geographical areas. Therefore, in order to change the ethics of an entire society in a specific direction, the morals of a critical number of individuals must be changed in that same direction at a certain moment in the historical time.

Debating over ideas is one way of changing the morals of communities. In situations in which reasonable people disagree, it is helpful and necessary to be able to sort out what each party believes and why. In order to reach a decision, an ethical reasoning protocol is necessary to investigate the situations through the lenses of veracity (what is known or believed about the situation), transparency (what is unknown in the situation) and responsibility (who is responsible for what).

Whenever different stakeholders committed to the implementation of the concept of sustainable development need to make decisions regarding practical matters, usually the debate is difficult as the different parties have different ethical standpoints of the sustainable development concept that are integrated in their pre-existent set of values. For this reason, this article aims to clear some of the ideas regarding the ethics of those willing to consistently implement sustainable development, meaning to provide the first step of the protocol, veracity.

More specifically, the article aims to list some of the known opinions and positions in the debates regarding some aspects of the concept of sustainable development such as: the value of the nature, the precautionary principle and

intergenerational equity. By no means have the authors wanted to suggest that these are the only ethical points embedded in the concept of sustainable development, merely that these are the ones in the scope of this article and that as for none of these points the debate is settled.

The author considers that before a community is able to agree on a course of action intended to solve environmental problems or implement sustainable development, which are issues that transcend any and all individual sciences, a higher perspective is necessary. By higher perspective the author refers to a perspective that is more inclusive than the current dispersed viewpoints formed by the different scientific disciplines such as economics, political sciences, environmental sciences or human sciences proposes at the moment. Before reaching this higher perspective, the review of the points of debate on different issues is helping to clarify the baseline of the discussions.

## 2.1 The Value of Nature

As sustainable development implies the sustainability of nature in general and biodiversity and ecosystems in particular, the need to take measures to protect the environment is deduced from the Brundtland Commission's definition.

How much we conserve of nature and how we do it is based on value we attribute to nature. Stakeholders that make conservation decisions operate based on certain principles. Let's imagine for example a situation in which a farmer wants to clear some part of the forest to plant crops in order to ensure the survival of his family. If in this case, the specific forest area to be cleared is inhabited by a species that is in danger of becoming extinct, there will also be stakeholders – such as NGOs for example– that will militate so that the farmer does not clear the specific forest area. Whenever arguing for one position or another, whether conserving the forest or not, it is necessary to state the ethical principles of the voices arguing in order to be able to have transparent and more effective discussions and negotiations.

Before we could settle any discussion on conservation, let's first take a look at the perception of the value of nature, which has continuously evolved during the last centuries. Thinking and acting like nature was something to be tamed, the first settlers of the North American continent operated with a frontier ethic, assuming an unlimited supply of resources. Whenever the resources become limited, more could be found elsewhere or alternatively substitutes could be created. This ethic is completely anthropocentric and considers only the needs of the human beings.

As decades passed and perceptions of communities evolved, nature became something of value that requires protection. Environmental ethics, which

considers humans as part of the nature not the managers of it, emerged.

In 1948, Aldo Leopold, considered the father of ecological philosophy and environmental ethics, presented the idea of preservation – affirming that all species should be valued based on their biotic right to life. With his concept of land ethic, Leopold argues that nature has intrinsic value, rejecting the utilitarian view as it conferred value on nature only if it is valuable to human prosperity (Leopold, 1948).

Fifty years later, the continuator of Leopold's work J. B. Callicott proposes a holistic ethics, which includes duties towards and sacrifices for Earth (Callicott, 1989). He thus formulated a new environmental ecocentric paradigm which is holistic and non-anthropocentric.

Building on Callicott's ideas, Rolston became the most eminent representative of the holistic environmental philosophy and ethics. Rolston (1989) argues that the interest of the individual is secondary to the interest of the whole. Opposing this idea is the individualistic ethics of Taylor (1986) which is based on the principle that every organism or community of living beings has intrinsic value and therefore deserves to be subject of moral treatment.

Another standpoint in this dispute is raised by Passmore (1980) who rejects the widening of the scope of morality by allowing a moral status to non-human beings. Passmore argues that only because the state of ecosystems impacts the human life and values, people have do have obligations concerning nature.

Going back to the example of the farmer that needs to clear the forest to ensure his livelihood, under some code of morals he could clear it, but under a different set of morals he could not. The world is filled with farmers that need to take similar decisions. If each farmer takes the decision to clear the forest, pretty soon there could be very little forests. This type of situation, similar in nature with Hardin's (1968) tragedy of the commons, is not the best outcome for the global community. Moreover, from a consequentialist stand point, these decisions to clear the forest are, arguably, wrong because of the effects of massive deforestation.

At this point one should consider the perspective of the farmer. He knows only what can happen to his family if he does not clear the forest, and he is most probably unaware of the bigger perspective of what the clearing of the forest entails and the impact of his actions. Operating with the survival of his kind in mind, can anyone argue that he is morally wrong?

In such cases, society at large, or rather informed stakeholders have a different perspective about the consequences of clearing the forest and could create a sets of policies that could be implemented in order to ensure the preservation of natural

habitats. The type and nature of intervention in this case is a different topic altogether which is not in the current scope of the article.

From a philosophical perspective, the value of nature is still debatable. On the one hand, there is the perspective of something having value only if that something is perceived. On the other hand, many agree with the perspective that the human appreciation of an object is not the driver of the value of the specific object.

Some of the authors (Leopold, 1948; Taylor, 1986; Callicott, 1989) argue that there is intrinsic value in nature and in all that is natural, while others (Passmore, 1980; Rolston, 1989) present an individualistic view, placing the human beings in the centre of the value arguments. Economists and ecologists sometimes argue in terms of “nature being important because it sustains human life” vs. “human activity sustains human communities” mostly due to a different definition of value and different scales of measuring value.

From a point of objective reality, this debate cannot be won from any of the two views as reality encompasses a multitude of perspectives which coexist simultaneously. Decisions need to be made based on priorities, priorities which could, ideally, be set by the communities involved and affected by the consequences of those decisions.

## 2.2 The Precautionary Principle

Some human activities have hardly predictable results. As in the example of the effect of the CFC that led to the degradation of the ozone layer, some consequences of human activities are not anticipated and actions need to be taken as a reaction to the effects which are sometimes irreversible.

There are many uncertainties regarding the function of ecosystems and the impacts of damages incurred by them as a result of the human actions. Jonas and Herr (1984) argue that the discrepancy between the human ability to anticipate and the ability to act implies an ethical choice that asks for a responsible restraint when taking action. This idea is known as the precautionary principle which states that in matters of a certain magnitude, whenever there is both a doom and bliss potential, greater weight should be given to the prognosis of doom.

Current generations need to be aware of their responsibility towards nature from a standpoint of stewardship, referring mainly to the present impact of the present-day anthropic actions. Humans are affected today by the pollution caused by automobiles currently in use. Moreover, the existence of agricultural practices in Europe represents a serious problem considering their results in air, water and soil pollution (Stoate et al, 2001; Milovanovic, 2007).

In addition, contemporary generations should also keep in mind that present actions have unknown, potentially harmful future effects and moreover, some decisions create irreversible effects like the case of species extinction, climate change or the production of nuclear wastelands due to nuclear testing and nuclear waste resulted from energy production. In some parts of the world citizens take action, like in Nevada (Kunreuther et al., 1990) proving that nuclear waste is both a current and a future concern of communities.

In the case of insufficient scientific evidence at the moment of the analysis, the precautionary principles advises that measures should be taken as to avoid theoretically major risks or the existence of a potential hazard. Actually, the fact that there is no sufficient scientific evidence or scientific accord on the matter, makes the decision subject to the precautionary principle. Following this line of argument, for problems such as climate change, even without consensus of scientists, measures should be taken in order to prevent potential future disasters. Here of course starts a different debate, of whom measures should be taken, meaning who is responsible. The question of establishing responsibility for taking action is however outside the scope of the current article.

The scientific literature presents the precautionary principle in two ways: either as ill-defined or as a value judgement (Sandin et al., 2002; Charnley, 2000) or a guideline in environmental decision making (Kriebel et al., 2001). The main argument that the precautionary principle should be viewed as a value judgement rests on the idea that it expresses a subjective attitude – that of risk adversity – and as an attitude, it cannot be confirmed nor falsified by scientists (Charnley, 2000).

On the other hand, the precautionary principle can be seen as an argument meant to affect policy making. Kriebel et al. (2001) argue that this principle has four components: taking preventive action in the face of uncertainty; shifting the burden of proof to the proponents of an activity; exploring a wide range of alternatives to possibly harmful actions; and increasing public participation in decision making. Moreover, this study argues that there is a complicated feedback relation between scientific studies and the setting of policy and that the precautionary principle highlights this tight.

As the debate whether current scientific proof or estimations are enough to take a certain action to avoid potential environmental hazards continues, many decisions are postponed. However, in order to move towards sustainability, towards preserving the nature, all human actions should be, arguably, governed by the precautionary principle. The balance between action and inaction should rest, arguably, on the shoulders of those that are mainly affected by the issue under discussion. The first

step however remains informing all the stakeholders while the biggest challenge arises when those affected are not those that currently can act.

### 2.3 Intergenerational Equity

When taking action and enacting policies, governments face the dilemma whether to improve the welfare of current population or to leave the posterity to solve the environmental issues created by intense economic development. As some policy decisions raise moral questions of relations between generations, we need to look into the theory of justice between generations, which refers to two different issues, environmental issues and economic issues.

The economic issue refers in general to budget deficits, long term debts incurred by governments, and also the economic consequences of the environmental policies.

On the other hand, the environmental issues mention pollution of the soil, contamination of water, extinction of species, loss of cultural monuments due to urban developments, deforestation, use of pesticides, the greenhouse effect, release of chemicals in the atmosphere, pollution of the atmosphere and the phenomenon of acid rain, the use of nuclear energy and the problem of the nuclear waste, damage of the ozone layer (De-Shalit, 1992).

The sustainable development concept brings into discussion the potential decision of current generation to exhaust resources and thus make them unavailable for future generations. Deforestation is an example in which generation A can create irreversible effects for the following generation B, as the “forest” resource and all the fauna and flora species are no longer there for generation B. Arguably, these resources are replaced with something else – let’s say arable land that can sustain generation’s B food needs, but the value of the replacement resources (agricultural land) cannot be measured against the forest. This comparison of value is the trap of interpersonal utility comparisons and moreover, inter-temporal comparisons. From the standpoint of the subjective theory of value, the value of the forest for generation A cannot be compared with the value of the agricultural land for generation B. This issue cannot be solved from the value perspective, and another view, for example the level of property rights can bring more clarity.

Whenever discussing the intergeneration equity, the timeframe considered is a crucial factor in the argumentation put forward. All economic calculations based on an assumed discount factor raise several problems, as the assumed discount factor can be based on different working

hypothesis which focus more on the economic or the ecological perspective (Yew-Kwang, 2005).

Considering the case of climate change, it can be argued that people continue to act in the same incorrect way as they lack a complete understanding of the consequences and impact of their actions in a time span longer than an individual’s lifetime. As the first generations that used fossil fuels could not envision the effects of their actions on the atmosphere, they started to develop entire industries and a new way of life based on the use of such fuels. Nowadays the perspective on the effects of the use of fossil fuels is much different, as there is significant debate regarding the effects and consequences of building entire industries on these fuels. This change in perspective is based on the evolution of knowledge of the human societies. Different studies (Knutti et al. 2002, Wigley, & Raper, 2001, Forest et al, 2002), even though they make distinct predictions regarding the evolution of the global climate as they are based on different climate change models, present however a consistent picture of future climate, both within the two- to three-decade planning horizon. These studies clearly point that the problem of climate change is an issue that transcends the time and actions from one generation to the next.

Nevertheless, there is the crucial aspect of geographically uneven effects of climate change. Even though the global change in mean temperature is expected to be around 0.68 K (Zwiers, 2002), the uneven distribution of effects across the globe creates local effects of climate change, with generally greater warming over land and at high latitudes than elsewhere. This means that some of the future generations can suffer more from the effects of the actions of current generations. Even though humans operate with ethics and base their judgements and decisions on ideas of right versus wrong, the complex natural systems do not obey the ethics of humans. Nature does not operate in linear thinking of “deserving” or “reward and punishment” used by humans. The effects observed in ecosystems strictly follow causes that currently elude the scientific understanding.

On the philosophical level, it has been argued that the actions of unborn individuals cannot affect the welfare and freedom of currently living people (Heilbroner, 1974). This statement suggests that future generations cannot have moral claims that are binding to the current generations. This aspect is very important also from the perspective of Taylor (1998) who goes further and asks what happened with the rights of the current generations, and what did the previous generations do with these rights. As past generation did not really wondered about the rights of future generations, why would we start now? Intergenerational equity has not

happened until the present moment, and it seems to be a mere promise to constantly elusive future generations.

There is also another perspective of the idea that no generation has the so-called right to deplete resources and to deprive future generations of them. The simplistic framing that generation A robs the potential for generation B to benefit from resource X seems to imply that only benefits and no costs are transferred into the future. If “past” generations cannot fully use a resource, the development possibilities are also restrained. In the absence of the steam engine, we would not be arguing today about the problematic effects of the use of fossil fuels. Fossil fuels would not be today a resource that “needs to be conserved” as they would have no value.

Yet another point is to be considered. When can we say that a certain quantity of a resource is enough for future generations? When “a certain amount” stops being enough? Who gets to decide that a specific resource remains in the “correct” amount for further use?

In addition, it could be noted that our generation has to pay for the errors of the past. We have to find ways to clean up the mess our grandparents made if we want to enjoy the full benefits of a healthy nature. And this is not quite equitable.

The intergenerational equity refers mainly to overexploitation (i.e. resource depletion, pollution) and the economic aspect (i.e. budget deficit and the economic consequences of environmental policies such as nuclear weapons). Whether present generations have a moral duty to consider how our policies affect the interests, desire and needs of future generations, as they depend on the actions of present generations, is still debatable.

### 3 Discussion

Moving forward towards a more sustainable future implies changing the ethics of enough people, including politicians and business men.

Considering the impact that business decisions have, creating a business environment that values and adheres to the environmental ethics could radically transform the landscape of the economic processes and events.

In an article that proposes a business paradigm that allows and enables the integration of environmental ethics into the business decision, York (2009) suggests that the pragmatic approach to decision making can be used to obtain competitive advantage. In the process of making morally correct decisions, the pragmatist will be encouraged to consider and carefully weight both the reasoning, empirical grounded in reality, and beliefs driven by community driving the decisions and the possible consequences.

Ethical principles are important, but one also must consider the implementation of the principles - the background and the context. In order to implement the same ethic principle, every group, nation or type of stakeholders must adjust their current ideas about the world and decide on the measures to be taken considering the specificities of their region, culture and current ethics. As the literature on development clearly shows, there is no one recipe to follow to obtain economic development in any given region, and there can be no unique way to achieve sustainable development across different countries.

In the decision making process, major factors will always be the culture and the specific morals of the decision makers. As the ethical principles are specific to each region, community or society, the solutions to the particular problems should be created on the local level but with the support of the global community.

According to Russell (1981), concepts and ideas and the status quo of society influence each other constantly. Across the history of philosophy, some thinkers argued for the tightening of social bonds (dominance of the state in social relations and economy) or at the other extreme, relaxing them (anarchism and extreme subjectivism). This range of ideas about the role of the state and the power that the state is awarded over the individual have the potential to create very different societies.

The problem of climate change and its extreme potential consequences raise also the idea of a global government. Will the global economy that needs to take global mitigation measures lead to global taxes and a global state? This will depend on the future ideas regarding the need to involve institutions, either private or public and their awarded power.

The climate change problem also raises the issue of responsibility. Who can or will oversee the implementation of the solutions? As this problem does not have an owner because responsibility can easily be thrown in the backyard of past generations or allocated by various algorithms to nations.

What can legitimate the decision that a global government can take? Will states be awarded the power over individuals’ liberty to save the planet of future human generations? Could market processes provide an alternative solution? Could spontaneous order in the context of well-informed actors bring light and a decision course of action accepted by all?

As all these questions are raised, the answer cannot come from one particular field of philosophy, science like political science or economy, never the less the answers will be relevant to policy making. A higher perspective, a more encompassing one needs to emerge.

#### 4 Conclusions

The concept of sustainable development is by its nature raising ethical questions and stakeholders aiming to implement the concept need to decide and express their perspective with respect to the value of nature, the precautionary principle and intergenerational equity.

This article aimed to highlight some of the ethical aspects of sustainable development that need to be taken into consideration during the decision making process of business people and policy makers.

As ethics is not universal and is definitely not an exact science, the clarification and transparency of the ethical standpoints regarding sustainable development may facilitate communications and negotiations among stakeholders.

However, the lack of consensus on ethical points cannot become an excuse or a reason for delay in taking action. Arguably, the best solution would be to adapt the implementation measures of sustainable development to the local ethics.

In the current diversity of opinions and different contexts of decision making - the aspects of interdisciplinary and multidisciplinary should not be neglected, as for complex problems such as climate change, no field of science can provide answers. Moreover, science is not enough and maybe different aspects of the human society such as spirituality should be involved in solving problems for which science does not have a clear answer.

Arguably, the clarification of the ethical and moral principles could improve the speed and efficiency of the decision making process on the environmental problems that affect the planet. The coherence of human population on the goals and priorities may not be achieved very soon, but this does not mean that action can be taken locally but in the context of a global perspective. Ethical positions, although take at the individual level have impact and relevance on the global scale.

#### References

- [1] Callicott, J.B. (1989). *In Defense of the Land Ethic. Essays in Environmental Philosophy*. New York: State University of New York Press.
- [2] Charnley, G. (2000). 1999 Annual Meeting. Past President's Message: Risk Analysis under Fire. *RISK newsletter*, 20(3).
- [3] De-Shalit, A. (1992). Environmental policies and justice between generations. *European Journal of Political Research*, 21(3), 307-316.
- [4] Forest, C. E., Stone, P. H., Sokolov, A. P., Allen, M. R., & Webster, M. D. (2002). Quantifying uncertainties in climate system properties with the use of recent climate observations. *Science*, 295(5552), 113-117.
- [5] Hardin, G. (1968). The tragedy of the commons. *Science*, 162(3859), 1243-1248.
- [6] Heilbroner, R. L., Heilbroner, R. L., Heilbroner, R. L., & Heilbroner, R. L. (1974). *An inquiry into the human prospect* (Vol. 74). New York: Norton.
- [7] Jonas, H., & Herr, D. (1985). *The imperative of responsibility: In search of an ethics for the technological age*. University of Chicago Press.
- [8] Knutti, R., Stocker, T. F., Joos, F., & Plattner, G. K. (2002). Constraints on radiative forcing and future climate change from observations and climate model ensembles. *Nature*, 416(6882), 719-723.
- [9] Kriebel, D., Tickner, J., Epstein, P., Lemons, J., Levins, R., Loechler, E. L., ... & Stoto, M. (2001). The precautionary principle in environmental science. *Environmental health perspectives*, 109(9), 871.
- [10] Kunreuther, H., Easterling, D., Desvousges, W., & Slovic, P. (1990). Public attitudes toward siting a high-level nuclear waste repository in Nevada. *Risk Analysis*, 10(4), 469-484.
- [11] Leopold, A. (1948). *A Sand County Almanac, and Sketches Here and There*. New York: Oxford University Press.
- [12] Milovanovic, M. (2007). Water quality assessment and determination of pollution sources along the Axios/Vardar River, Southeastern Europe. *Desalination*, 213(1), 159-173.
- [13] National Research Council (NRC US). Policy Division. Board on Sustainable Development. (1999). *Our common journey: a transition toward sustainability*. National Academies Press.
- [14] Passmore, J. (1980). *The philosophy of teaching*. London: Duckworth
- [15] Rolston, H. (1989). *Philosophy gone wild* (Vol. 185). Buffalo, NY: Prometheus Books.
- [16] Russell, B. (1981). *History of western philosophy: and its connection with political and social circumstances from the earliest times to the present day*. London: Allen and Unwin
- [17] Sandin, P., Peterson, M., Hansson, S.O., Ruden, C. & Juthe, A. (2002). Five charges against the precautionary principle. *Journal of Risk Research* 5 (4), 287-299
- [18] Santillo, D. (2007). Reclaiming the Definition of Sustainability. *Environmental Science and Pollution Research*, 14(1), 60-66.
- [19] Stoate, C., Boatman, N. D., Borralho, R. J., Carvalho, C. R., De Snoo, G. R., & Eden, P. (2001). Ecological impacts of arable intensification in Europe. *Journal of environmental management*, 63(4), 337-365.

- [20] Taylor, J. (1998). Sustainable Development: A Model for China? in Dorn, J. A. (1998). *China in the new millennium: Market reforms and social development*. Cato Institute.
- [21] Taylor, P.W. (1986). *Respect for Nature- A Theory of Environmental Ethics*. Princeton, NJ: Princeton University Press.
- [22] Wigley, T. M., & Raper, S. C. (2001). Interpretation of high projections for global-mean warming. *Science*, 293(5529), 451-454.
- [23] World Commission on Environment and Development (WCED). (1987). *Our Common Future*. New York: Oxford University Press.
- [24] Yew-Kwang, N. G. (2005). Intergenerational impartiality: Replacing discounting by probability weighting. *Journal of Agricultural and Environmental Ethics*, 18(3), 237-257.
- [25] York, J. G. (2009). Pragmatic sustainability: translating environmental ethics into competitive advantage. *Journal of Business Ethics*, 85(1), 97-109.
- [26] Zwiers, F. W. (2002). Climate change: The 20-year forecast. *Nature*, 416(6882), 690-691.