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25 YEARS OF SUSTAINABILITY. A CRITICAL ASSESSMENT

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Abstract. 25 years have passed since the ‘Brundtland Report’ defined sustainability as a possibility to equally meet current and future needs. 15 years later, the author of the definition stated that despite of the fact that the definition does not need to be changed, its understanding bettered off during the interval. 25 years later, the present paper takes an in-depth look at the concept and its practical implications. One of the issues being addressed refers to the pillars of sustainability; their number increased by 25% to include the cultural pillar in addition to the economic, social, and cultural one. Spatial thinking added a new dimension, translating into concepts like ‘sustainable communities’ or ‘self standing village’ at the local level, and ‘polycentricity’ and ‘cohesion’ at the regional one. Furthermore, practical implications include environmental impact assessment (evolving towards strategic impact assessment), internalization of externalities, ecological restoration, and a new view on conservation, different from the one addressed by the ‘Zero Growth Strategy’. In addition, the paper discusses several criticism addressed to the concept and its implementation, attempting to reveal their underlying causes. Overall, the critical analysis shows that the attempts to achieve sustainability did not change the concept as much as its understanding.

Introduction

Twenty five years had passed since WCED published the report titled “Our common future”, but referred later as the Brundtland report, after its author (Brundtland, 1987). Approximately fifteen years after, Dr. Gro Harlem Brundtland stated in an interview that her definition of sustainability should not change (Bugge and Watters, 2003). However, less than five year later, summing up an international view of development strategies, Steve Bass (2007) concluded that the

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evidence indicated that development did not turn sustainable. Nevertheless, from a theoretical viewpoint, Dr. Angheluță Vădineanu (2009) refers to a certain theory of sustainability as a stage in the evolution of systemic ecology.

Taking into account these milestones, the present research aims at seeing whether there is any progress in understanding sustainability and what is needed for its implementation. We are merely asking questions rather than answering them. Issues of interest include the pillars and dimensions of sustainability; how did they change over the last quarter of century? What are the new concepts developed in relationship to them? Other questions regard sustainability itself; did its definition change, or at least the understanding of its definition? What is actually needed to achieve sustainable development? What are the driving forces that oppose sustainability?

1. Sustainability: the Concept

According to what Dr. Gro Harlem Brundtland wrote, sustainability is the “*development that meets the needs of the present without compromising the ability of future generations to meet their own needs*” (Brundtland, 1987). According to what she said fifteen years later, the same definition is still valid today (Bugge and Watters, 2003), even though many authors attempted to redefine it; as a matter of fact, the website at <http://www.reds.msh-paris.fr/communication/textes/devdur.htm> collects some of the significantly different definitions proposed in the meantime. Their analysis reveals three trends; one is mathematical, suggesting the maintenance of specific indicators below or above some threshold value (Lester and Becky, 1987) or securing their monotonic growth (Beaud, 1994). The second addresses the wellbeing issue (Barbier, 1987), and the last one deals with the resilience of systems (Conway and Barbier, 1986). In addition to the author's understanding, other researchers propose different meanings of sustainability or emphasize some particular sides of it.

If the definition did not change, then what else changed? According to Dr. Gro Harlem Brundtland, the understanding of sustainability bettered off. The question is, ‘What particular aspect of sustainability needs to be better understood?’ The definition focuses on human needs (Norton, 1992); as a matter of fact, the first principle of Rio de Janeiro Declaration stresses out this particular aspect, stating that “*human beings are at the centre of concerns for sustainable development*” (United Nations, 1992c).

Dr. Gro Harlem Brundtland is underlining two issues which are now better understood; one is the nature of the pillars and dimensions of sustainability, and the other is their integration. The first issue is discussed extensively in the next chapter, and their integration in the following one.

2. Sustainability: Pillars and Dimensions

Many authors consider that sustainability has three traditional pillars – economic, social, and environmental (Basiago, 1999; OECD, 2004; Littig and Grießler, 2005; Gibson, 2006; Murphy, 2012). Nevertheless, other authors consider a fourth cultural one, acknowledging its potential for economic growth (Hawkes, 2001). Its recognition was the result of an intense lobby by the United Cities and Local Governments, who officially recognized it in 2010 (United Cities and Local Governments, 2010). Nevertheless, it has addressed been earlier; the Convention on Biological Conservation (United Nations, 1992b) acknowledges the role of traditional cultural practices, by recognizing “*traditional knowledge, innovations and practices relevant to the conservation of biological diversity and the sustainable use of its components*”. Elaborated descriptions are provided by Agenda 21: these people “*developed over many generations a holistic traditional scientific knowledge of their lands, natural resources and environment*” (United Nations, 1992a). In a more generalizing way, the 2000 CEMAT “Guiding Principles for Sustainable Spatial Development of the European Continent” recognize “*cultural heritage as a factor for development*” (CEMAT, 2000). For this reason, it needs to be stressed out that the cultural pillar is considered equally important to the traditional ones, even though it has been added later (United Cities and Local Governments, 2010).

Some of the dimensions of sustainability overlap with its, economic, social, environmental, and cultural pillars. Nevertheless, a fifth dimension, of equal importance, was added to acknowledge the fact that sustainability occurs in territories of different sizes, corresponding to different administrative divisions (Bottero and Peretti, 2010; Péti, 2012). Because of its importance and relative novelty, spatial sustainability is discussed in a separate chapter.

Other dimensions are sub- or cross-sectors of the main ones; their interference is discussed in the next chapter. Examples include transportation, energy, housing, infrastructure, education, science, ethics, and management. Essentially, the guiding principle is the same, *i.e.* includes the ability of a system to self-sustain (autarky) after starting up by its own means, but evidence of (sustainable) growth is required in addition to it (Daly, 1990; Tofan, 1999; Curtis, 2003; Müller *et al.*, 2011; McLellan *et al.*, 2012).

To simply enumerate few approaches, the Club de la Budapest, founded in 1993, focused on a change of conscience and ethics (László, 2004; Ianoș *et al.*, 2009); others looked for technological solutions (such as the ones promoted by the 1996 issue of *Daedalus*), considered the environmental impact of megalopolises (Dansereau and Weadock, 1970), or proposed economic, social or political issues or mixed strategies (Petrișor, 2011b).

3. Spatial Sustainability

A 2008 proposed definition of spatial sustainability is “*development providing for a territorial balance of satisfying at the same rate the economic, social and environmental needs of present and future generations*” (Petrișor, 2009). According to Collignon (2009), its aim is to “*ensure the coherence of socio-economic objectives in relationship with the territory and its ecological and cultural functions, aiming to enhance the quality of present and future generations’ life by creating sustainable communities able to manage and use resources efficiently, exploiting the innovative ecological and social potential of the economy and guaranteeing the welfare, environmental protection and social cohesion*”.

The spatial dimension has two important functions: (1) balances at different territorial levels cohesion and polycentricity, and (2) results into local ‘sustainable communities’; at the same time, it is related to ‘urban regeneration’. In the first case, **territorial cohesion** is defined as a “*balanced distribution of human activities in a territory*” (DG Regional Policy, 2004:3). The balance is reached by reducing existing gaps (for example, between urban networks), prevention of territorial imbalances (for example, between regions), through sectoral policies with spatial impact and more coherent regional policies. The active process leading to cohesion is called convergence (van Well, 2006:4). **Polycentricity**, a “*spatial organization of cities characterized by a functional division of labor, economic and institutional integration, and political co-operation*” (Nordic Centre for Spatial Development, 2003:3), is given by the *morphology* of a territory (number of human settlements, their hierarchy and distribution) and *relationships* (fluxes and cooperation) of these elements (Nordic Centre for Spatial Development, 2005:3). The second report cited distinguishes three levels of *polycentricity*: *macro* – the European alternative to the “Pentagonal”, *mezzo* – regional, two or more cities are complementary, providing to the people and companies from the common areas access to urban functions that normally can appear only in higher ranked cities, and *micro* – intra-regional, complementary urban and economic functions are strengthened by the grouping of settlements (Nordic Centre for Spatial Development, 2005). Furthermore, the scale can move down to the city level, as the multiple development nuclei of a city can be seen as a form of polycentricity (McMillen and Smith, 2003).

The two concepts act together like the drivers of stability in an ecosystem: polycentricity provides for diversity, boosting the development of new centers, even of local importance, while cohesion gives coherence to the entire system, intervening when polycentricity results into serious imbalances with negative consequences; *e.g.*, a center that develops at the expense of stopping the development of all surrounding ones (Peters, 2003; Waterhout *et al.*, 2005; Meijers, 2008). The ecological consequence of the two is that polycentricity disperses the impacts – particularly pollution – generated by the development of

single centers (Coffey and Shearmur, 2002; Peptenatu *et al.*, 2011, 2012), while cohesion allows for developing coherent environmental policies for the entire territorial system.

Sustainable communities were defined by the 2005 Bristol Accord as “*places where people want to live and work, now and in the future*” (Office of the Deputy Prime Minister, 2006). Even though the report refers to ‘communities’, the eight characteristics making a community sustainable point to urban areas:

- **Active, inclusive and safe:** fair, tolerant and cohesive with a strong local culture and other shared community activities;
- **Well run:** with effective and inclusive participation, representation and leadership;
- **Well connected:** with good transport services and communication linking people to jobs, schools, health and other services;
- **Well served:** with public, private, community and voluntary services that are appropriate to people’s needs and accessible to all;
- **Environmentally sensitive:** providing places for people to live that are considerate of the environment;
- **Thriving:** with a flourishing, diverse and innovative local economy;
- **Well designed and built:** featuring quality built and natural environment;
- **Fair for everyone:** including those in other communities, now and in the future (Office of the Deputy Prime Minister, 2006).

A similar concept has been developed for rural communities; the ‘*self-standing village*’, developed by Mihail Eminescu Trust, is “*an original concept promoting the sustainable development of rural communities by valorizing their unique heritage – monuments, vernacular architecture, landscape and biodiversity*” (Fernelend, 2010).

New socioeconomic constraints and people needs impose to human settlements a need for change (Turok, 1992; Bassett, 1993; Loftman și Nevin, 1995; Healey, 2004; Ng, 2005); under this framework, urban regeneration is the “*adjustment and re-modeling process oriented to improving urban living conditions*” (Petrișor, 2012b).

4. Integrating the Pillars and Dimensions of Sustainability

The inter-relations of the pillars and dimensions of sustainability have been widely discussed. Some scientists applied the taxonomical principles to label each possible intersection. The image displayed in Fig. 1 has been quoted and used by numerous studies, since it is distributed under the Creative Commons Attribution-Share Alike 2.0 France license; it has been originally published by Jacobs and Sadler (1989).

The particular relationship between the economic and environmental pillars, perceived through the economic perspective as two types of capitals, has been analyzed by Vădineanu (2008) based on the assumptions of classical economy (where the natural capital is used disregarding its diminishing to increase the created one), ‘zero growth strategy’ (stopping the development and creation of capital, and consequently the reduction of natural capital), environmental economy (understanding that the decrease of the natural capital results into a reduction of the created one too), and sustainability (implying ecological restoration, which increases the natural capital, while the integration of environmental policies in socioeconomic strategies accounts for no longer depleting the resources of the natural capital while the created one is increased).

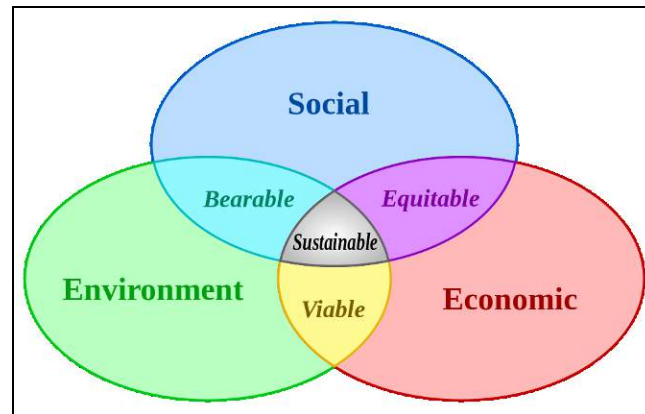


Fig. 1. Three-pillars view on sustainability. Image freely distributed under the Creative Commons Attribution-Share Alike 2.0 France license at http://en.wikipedia.org/wiki/File:Sustainable_development.svg

A similar theory is proposed by Petrișor and Sârbu (2010): the creation of capital leads to an increased complexity of territorial systems and growth of geodiversity; if natural resources are managed in an environmental-friendly manner based on a holistic managerial approach, biodiversity is “amplified” through the human contribution and geodiversity increases. An important conclusion of these findings is that sustainability implies a co-development of the natural and man-made capital, also underlined by Vădineanu (2004).

The integration is manifested and achieved through the recognition of all pillars and their equal consideration when designing the sectoral strategies of development at all administrative levels (Pope *et al.*, 2004; Gibson, 2006; Fisher *et al.*, 2008), as stated also in the title of the 8th chapter of Agenda 21: “integrating environment and development in decision-making” (United Nations, 1992a), and

the integration of the policies of development for all administrative and territorial levels – international, national, regional, and local, accounting for the principles described in the previous chapter (aiming for a balance between polycentricity and cohesion). This issue is particularly important, as there is often a biased perception of sustainability addressing only or especially environmental issues (Smyth, 2011).

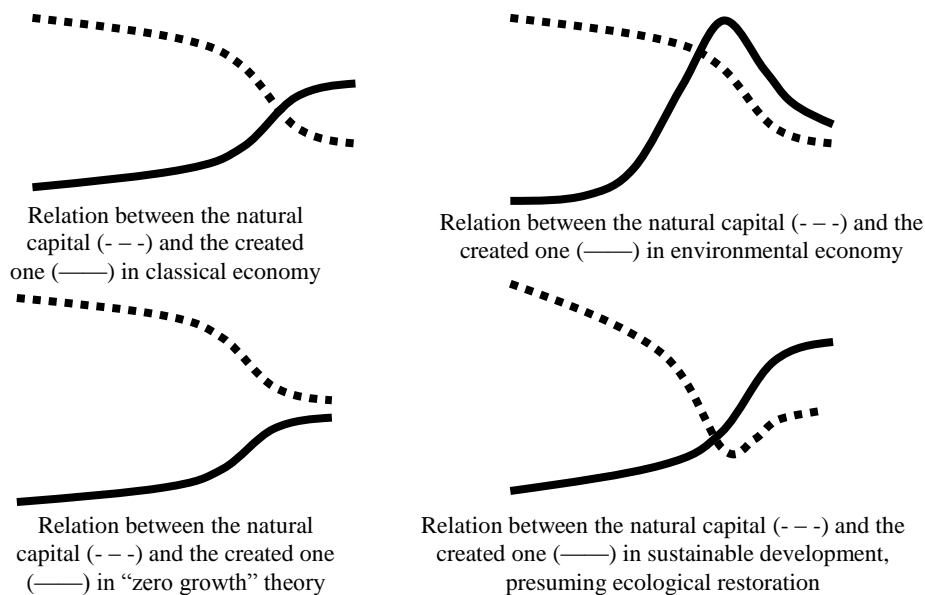


Fig. 2. Relationship between natural and created capital under different economic theories (Vădineanu, 2008)

5. Basic Assumptions of Sustainability

The theory of sustainability is based on a conceptual framework analyzing the evolution and underlying theoretical background of all implicit or explicit models of development, according to their consequences over the environment and response of the natural capital, presented in *Table 1*. Sustainability relies on a holistic and systemic understanding of the environment as a hierarchy of functional structures, regardless of their natural or socioeconomic nature, replacing the anthropocentric one (Vădineanu, 1998; Ungureanu *et al.*, 2011). Ecological systems are the support of life and constitute the ecological foundation (Pawlowski and Auslander, 2000; Vădineanu, 2007; Haberl *et al.*, 2009).

This theory is based on understanding the environment, from a trans-disciplinary perspective, as a sum of capitals; the first one is the natural capital, represented by the natural, life-supporting systems, constituting the ecological

foundation, and composed of environmental goods and services, and the second, representing the anthropic environment or anthroposphere (Vădineanu, 1998), has three components: (1) the economic capital, composed by built infrastructure (physical capital), the technosphere (technological environment), (2) the social capital, consisting of institutional/administrative capital, and of all relations among humans, regulated (by juridical and socio-economic constraints) or not, and (3) the cultural capital, consisting of a traditional set of perceptions and practices, and human knowledge and abilities (Vădineanu, 1998; Petrișor, 2011b).

Tab. 1. A timeline of the relationships between human society and natural systems

<i>Moment</i>	<i>Early history</i>	<i>Industrial revolution</i>	<i>Oil Crisis, Club of Rome (1970's)</i>	<i>Brundtland Report, 1988; Rio de Janeiro, 1992</i>
<i>Model</i>	No model	No model	“Zero growth” strategy	Sustainable development
<i>Action</i>	Life in harmony with nature	Degradation of the natural capital	Strict conservation (preservation) of biodiversity	Conservation, impact assessment, ecological restoration, internalization of externalities
<i>Consequence / reaction of environment</i>	Low impact	Reduction of environmental goods & services	Development would stop	Co-development of natural systems & human society
<i>Ecological approach</i>	None	Anthropocentric	Anthropocentric	Holistic

It is obvious that the main barrier that sustainability must pass is the competition between the natural and anthropic capital (Mazilu and Giurgea, 2011). On the one hand, man-dominated systems are strictly dependent on goods and services provided by the natural ones (Sârbu, 1999, 2006), but they are also competing for space (Peptenatu *et al.*, 2011, 2012; Petrișor, 2012a). The drivers of environmental change are political (Peptenatu *et al.*, 2010), social and economic (Petrișor *et al.*, 2010). More important than the drivers themselves is their interaction, due to synergistic effects. The term “global change” was introduced to encompass all man-generated impacts affecting the ecosphere: land use changes, climate change, and energy use (Dale *et al.*, 2011).

Another important point that needs to be stressed out here, even though it will be discussed in the next chapter, is that the principles of sustainability do not apply only to concrete and ongoing activities, but also to plans, projects, programs, and to support activities, such as management, legislation etc. (Owens, 1994; Judge and

Douglas, 1998); this is, in fact, an illustration of the international precautionary principle of environmental law (Trouwborst, 2009).

Last but not least, scale is a crucial issue in sustainability. It has been shown above that the key to sustainability is integration, which needs to be manifested, from a spatial perspective, at all administrative and territorial levels. More exactly, according to Dr. Angheluță Vădineanu (2004, 2007, 2009) and Dr. Radu Ștefan Vădineanu (2008), the key to sustainability is balancing socio-ecological complexes at all hierarchical levels.

6. Practical Implications of Sustainability

Previous discussions have attempted to analyze the theoretical framework of sustainability, addressing issue related to what needs to be known and what the appropriate approaches to achieving a sustainable development are. In the next paragraphs, the discussion focuses on the concrete means to turn development sustainable in practice.

Essentially, there are three issues needed to account for; (1) ecological restoration, (2) environmental impact aimed at internalizing externalities (accounting for the “polluter pays” principle) and avoiding further degradation (the precautionary principle, mentioned in the previous section), and (3) conservation of biodiversity.

With respect to the first one, sustainability must account for the mistakes made in the past through the ecological restoration of degraded systems, in order to offer future generations an unaltered part of today’s natural capital; the ecological engineering techniques are an important instrument. This goal is connected to the third one, as safeguarding for the future generation an unaltered part of present environment requires bringing it to almost pristine conditions (Aronson *et al.*, 2006; Choi *et al.*, 2008).

Sustainability must look at all present activities and assess their impact (economic, social, environmental, and cultural) from a triple perspective: (1) ensure that all activities are designed for a long term; (2) assess the consumption of resources and generation of waste or pollution in order to hold the polluter responsible and prevent further degradation (Clive, 1999); and (3) provide mechanisms for the internalization of externalities (Pretty *et al.*, 2001), putting into practice the “polluter pays” principle. At the same time, benefits must be returned to those who give up over some benefits in order to help the future generations (such as the indigenous communities or companies likely to adopt an environmentally-friendly behavior etc.). Based on these principles, the new integrated approach, called Strategic Environmental Assessment, tends to replace the Environmental Impact Assessment. The main difference between the two is that

“the object of assessment generates different methodological requirements related to the scale of assessment and to the decision-making process” (Partidário, 2007). The new approach integrates better the pillars of sustainability (Abaza *et al.*, 2004) and is particularly useful to solve specific issues of transition countries, such as the consequences of industrialization (Alshuwaikhat, 2005).

Finally, sustainability must safeguard for the future generations an important part of today’s biodiversity, through the declaration of natural protected areas (Hoag and Skold, 1996; Holling, 2000). The design of such areas must take into account several principles: (1) conservation must not be understood as strict preservation, in an unaltered state, but as maintenance of systems within the carrying capacity limits, ensuring the structural and functional integrity of life-supporting systems, (2) conservation must reflect the international, national, regional, and local representativeness of chosen areas for the biogeographical space, ecological zoning, or spatial other form of diversity, (3) conservation implies an active management, requiring the existence of a plan and a structure responsible for its implementation, (4) within the protected areas, zoning must allow for a differentiated management; the core areas must be buffered gradually, ensuring the transition of practices to “no restriction” regions such that the core areas are not affected; (5) local populations must be attracted in drafting the plan of management, ensuring their support for its implementation, including a correct redistribution of benefits, and (6) multi-sectoral, regional, national, and international cooperation is very important for making all protected areas working together as a global network (Petrișor, 2011a).

7. Criticisms addressed to Sustainability

While it seemed that sustainability could solve all environmental issues, many authors started criticizing it. Criticisms ranged gradually from addressing the inability of putting it into practice to dealing with its means and finally denying its very essence; on a gradual scale, Steve Bass (2007), researcher at the International Institute for the Environment and Development and former advisor on environmental issues to the UK Department of International Development, showed that *“three UN-commissioned reports from 2005 show clearly that development has not yet become sustainable”*. Serge Latouche (1994) criticized the means stating that *“sustainable development is like the road to hell, paved with good intentions”*. Finally, Nicholas Georgescu-Roegen (1991:53) addressed the core saying that *“there is not the slightest doubt that sustainable development is one of the most destructive concepts”*.

Analyzing the nature of criticisms, Sneddon *et al.* (2006) mention fundamental contradictions between the economic growth in developing countries

and conservation, and the omission of power relations among the local-to-global actors and institutions supporting unsustainable development. Smyth (2011) resumes criticisms concerning the institutionalization of sustainability, as well as its programmatic implementation resulting into a precedence of the interests of donors over those of recipient communities.

Conclusions

This research attempted to summarize the changes occurred during a quarter of century since the concept of sustainability was defined. The analysis was focused on theoretical and practical issues. The results revealed that the definition did not change, but its understanding was enriched substantially. The number of pillars increased by 25% and many dimensions were addressed; for each of them theories were elaborated, turning sustainability into a science. However, little progress was made with respect to its practical implementation, resulting into numerous criticisms, addressing its means and even its core. Even though humanity seems to understand better what needs to be done for achieving sustainability, these requirements seem to be hard to put into practice. It can be only hoped for the concept to become operational in a degree commensurate with its improved understanding.

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