Chapter 8
Sustainable Development in Economics

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Abstract The new paradigm of sustainable development has not yet penetrated all of the business sciences. Although the concept has found its way into management studies in business administration programs, as well as into marketing and other subdisciplines, most economists have ignored the topic. Two contrasting positions are identifiable in the relatively few publications to date that deal with this subject: The position advocated in neoclassical economics stands in irreconcilable opposition to that of "ecological" economics. The proponents of both disciplines, however, initially start with the premise of intergenerational equity, which states that the lifestyles of current generations may not jeopardize the quality of life of future generations (WCED, Our common future, Oxford, 1987, p. 43).

Keywords Neoclassical economics • Ecological economics • Substitution rule • Weak sustainability • Strong sustainability • Balanced sustainability • Post-growth economy

1 Introduction

The new paradigm of sustainable development has not yet penetrated all of the business sciences. Although the concept has found its way into management studies in business administration programs, as well as into marketing and other subdisciplines, most economists have ignored the topic. Two contrasting positions are identifiable in the relatively few publications to date that deal with this subject: The position advocated in neoclassical economics stands in irreconcilable opposition to that of "ecological" economics. The proponents of both disciplines, however, initially start with the premise of intergenerational equity, which states that the lifestyles of current generations may not jeopardize the quality of life of future generations (WCED 1987, p. 43).

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H. Heinrichs et al. (eds.), *Sustainability Science*, DOI 10.1007/978-94-017-7242-6_8

The proponents of neoclassical economics pursue intergenerational equity through the preservation of a stock of capital (natural resource + real capital). Accordingly, this concept allows for the substitution of nonrenewable natural capital by reproducible real capital as long as the total remains the same. This aspect is fundamentally rejected by the proponents of ecological economics. The proponents of ecological economics demand a model of sustainable development that is ecocentric and recognizes the interrelationships between the two dimensions of ecology and economy. The social dimension, as in neoclassical economics, is largely ignored.

The proponents of ecological economics critique neoclassic theory mainly through a focus on two points: the idea of maximizing utility and the inherent constraints on the individual. Within the framework of ecological economics, an ecocentric view of sustainability holds that the preservation of environmental systems must be the starting point for any argumentation (von Hauff and Kleine 2009, p. 30). The advancement to a post-growth society is viewed as a further development in ecological economics, which is briefly introduced in this chapter.

The opposing positions of neoclassical economics and ecological economics can be overcome by a balanced view of sustainability. Balanced sustainability is not in itself a complete concept. Several essays in this regard emphasize different points and are also briefly discussed here. The essays on balanced sustainability are linked to the greater question of whether sustainable growth is even possible.

First, it is necessary to examine the opposing positions of neoclassical economics and ecological economics regarding sustainable development. This looks at the controversy between weak and strong sustainability. Both approaches share the goal of intergenerational justice to ensure that future generations are not worse off than the generations now living. The neoclassical proponents of weak sustainability seek intergenerational sustainability by preserving the total capital stock (human-made capital + natural capital). In this model, natural capital can be substituted with human-made capital. Consequently, there can be a decrease of natural capital together with growth in human-made capital, as long as the total capital stock remains constant. The proponents of strong sustainability (ecological economists) reject this idea and demand the preservation of natural capital for future generations.

The more recent debate about a post-growth society is included within the framework of ecological economics. The focus of the subsequent section is on how to overcome the controversy between neoclassical economics and ecological economics in the context of balanced sustainability. The most important findings are summarized in the conclusion.

2 Sustainability in the Context of Neoclassical Economics

The neoclassic understanding of sustainability is based, in principle, on the disagreement that arose over the first Club of Rome report on the "The Limits to Growth," which was published in 1972. The report critically called into question the contemporary goal of permanent growth through economic activity. The key insight

of the report was that essential nonrenewable resources would be exhausted in a foreseeable period of time in a world economy oriented toward exponential growth. It concluded that there are limitations to growth. As a result, efficient resource models arose within the framework of neoclassical environmental economics, which acknowledged the scarcity of natural resources. Borrowing from social welfare economics, these models differentiate between nonrenewable and reproducible natural resources in addressing the need to ensure the satisfaction of basic human needs (von Hauff and Jörg 2013, p. 53 ff).

The debate has been strongly influenced by Robert Solow with the integration of neoclassical and resource economics in development theory since the 1970s. He positioned himself, as did Josef Stiglitz, as a critic of the "The Limits to Growth" report. He determined, "The world can, in effect, get along without natural resources, so exhaustion is just an event, not a catastrophe (Solow 1974, p. 11)."

In the mid-1980s, he developed the so-called constant capital rule, based on the "Hartwick Rule." The Hartwick rule was proposed by John M. Hartwick and says that the sustainable use of resources in an economy is also dependent on exhaustible resources (1977). The important point it makes is that some resources must be used efficiently and the scarcity rents on current extraction of those resources be fully reinvested in human-made (or manufactured) capital. This is the way to insure the level of consumption by future generations is maintained.

In this respect, Solow presented himself as a representative of the so-called "weak" sustainability, which assumes complete substitutability of natural capital with real capital, if necessary. The dominant neoclassical position on sustainability today assumes a level of utility (the satisfaction associated with consumption) that does not decrease over time. At a minimum, this implies that average utility for future generations must equal the average utility of the current generations. It must be critically noted that utility is very subjective and the wide-ranging variation requires specification (Ott and Döring 2008, p. 102; Panayotou 2000, S. 61)

The range of variation extends from the utilitarian position of happiness, to microeconomics as a function of consumption, to the exercise of capabilities. Utility, specifically in the context of weak sustainability, is interpreted only as a function of consumption. This position presupposes a narrow understanding of consumption, in other words, the consumption of material goods. The consumption of intangible assets – assets like a beautiful sunset – is not included. Therefore, for the proponents of weak sustainability, economic growth is the key to sustainability.

If a constant stock of capital is maintained, average utility will be constant and current utility maximized. The logical question to ask of this theory is, how are the future costs of natural destruction (depletion of natural capital) to be valued today? This leads to the issue of intertemporal equity. In other words, what are the future value of environmental pollution and the consumption of exhaustible resources today? Furthermore, this presupposes the intertemporal allocation of the resource used across generations (von Hauff and Jörg 2013, p. 126). In the context of weak sustainability, this leads to the position that the substitution of natural capital by reproducible real capital is, in principle, without limits. The neoclassical paradigm is based on the optimistic view, which has risen to dominance today because of

technological advances and higher efficiencies in the use of the factors of production. Correspondingly, the depletion of a nonrenewable resource can be compensated for with real capital.

Robert M. Solow

- Emeritus Professor of the Massachusetts Institute of Technology (MIT).
- Main research area: economic growth theory.
- In 1956, he released the essay "*A Contribution to the Theory of Economic Growth,*" which contains the well-known Solow model.
- In 1987, he received the Nobel Prize for his work on economic growth (Fig. 8.1).

Fig. 8.1 Robert M. Solow

Therefore, it is not the preservation of nature that is important, but rather the safeguarding of overall prosperity. With this reasoning, Solow theorized that economic growth is possible even without natural resources (Solow 1997, p. 267). Under a profit maximizing viewpoint, if there is a better option than the preservation of natural capital, it should be taken. To this extent, projects for environmental and climate protection or for the conservation of nature are obligated in the framework of weak sustainability to prove they are superior to or provide a greater benefit than other investments over the long term.

- ***Task:*** *Briefly explain the substitution rule.*

In a neoclassical argumentation, the arguments of weak and strong sustainability are merged. It suggests that a compensation for diminishing or depleted natural capital by means of real capital is justifiable as long as it does not fall below the defined threshold value of vital capital needed to safeguard strong sustainability (von Hauff and Jörg 2013, p. 128). In this context, a two-step sustainability rule

must be differentiated from weak sustainability. Absolute restrictions are required as drawn from the argumentation of ecological economics.

The two-step sustainability rule states that safeguarding the vital stock of natural capital in this way can result in the continued increase in the standard of living according to weak sustainability. The substitution of natural capital with real capital is acceptable as long as it does not fall below the threshold stock of natural capital (safe minimum standards). It is self-evident that it is both risky and controversial to attempt to define a minimum requirement for the natural capital essential for human survival when the reality is characterized by risk and uncertainty. Furthermore, it neglects other functions of the environment, such as the function of human relaxation and regeneration in nature. Consequently, the view of nature in the two-step sustainability concept is based on a utility-oriented understanding of sustainability. It therefore corresponds largely with weak sustainability.

In summary, it can be said that in the framework of formal models, neoclassical economics recognizes the ecological challenges and attempts to portray environmental and resource issues as an allocation problem. Neoclassical economics also reacts to the intertemporal dimension of the environmental issues and aligns itself with the position of weak sustainability. This is by no means a new development but, rather, has its origins in the approaches developed back in the 1970s. That is to say, neoclassical economics is based on a definition of sustainability characterized by safeguarding a level of utility that never decreases with the passage of time.

3 Sustainability in the Context of Ecological Economics

The proponents of ecological economics developed strong sustainability in opposition to weak sustainability. Ecological economics was inspired by the work of Nicholas Georgescu-Roegen, Kenneth Boulding, and William Kapp and was introduced into the economic debate in the 1970s (von Hauff and Kleine 2009, p. 29ff). This concept initially became established in the USA during the 1980s. In 1987, the International Society for Ecological Economics (ISEE) was founded (Rogall 2012, p. 119). Ecological economics is defined by its focus on the environmental model of sustainable development, which takes the categories ecology and economy into account.

Consequently, the economic subsystem must be returned to the biophysical environment and, especially in industrialized countries, grow no further, because the economy depends on the availability of natural resources and the carrying capacity of the natural sink function. If the progressive burdening or destruction of nature continues, natural capital could become a limiting factor of production. In this respect, human awareness is required with the will to preserve ecological systems as the basis of life for future generations and to subordinate economic self-interests. However, the third dimension of sustainable development, the social dimension, is neglected, as in the neoclassical economic theory (von Hauff and Kleine 2009, p. 30).

In contrast to the neoclassical economists, the major advocates of ecological economics, like Daly and Costanza, soundly reject the substitution rule. Rather than substitutability, they propose the complementarity of natural and real capital, to the

extent that production depends on natural capital. Complementarity is when a natural resource is required for the production of goods. In some cases, there are functions of natural capital in the production of goods that cannot be provided by real capital (Costanza et al. 1997, p. 5ff).

The proponents of strong sustainability promote the idea of a "steady-state economy" (Daly 1991, p. 35ff). A steady-state economy, or balanced economy, as defined by Daly, is an economic system supplied with a constant stock that is sufficient to provide the material goods for a "good life." This is the reason why the economic system is viewed as a subsystem of the environmental system. The economy is dependent – as mentioned above – on resource availability and the capacity of nature sinks (Ott and Döring 2008, p. 145).

- ***Question:*** *Please explain, why does ecological economics support the model of an economic system as a subsystem within the environmental system?*

In light of global problems like the exponential population growth, increasing pollution, and degradation of the environment, human-made climate change and the sharply increasing level of consumption of nonrenewable resources, a reduction in the demands made on the ecological system in economic processes is considered to be essential. This may be the only way to preserve nature as an integrated system and reduce the (not exactly calculable) risk of a negative backlash from the ecosystems to the economy and society. This is a major requirement, according to Costanza, for the equitable distribution of the use of natural resources across the generations (Costanza et al. 1997, p. 83).

Ecological economics is not only about the elimination of negative external effects by means of internalization strategies such as statutes, bans, eco-taxes, bilateral negotiations, or certificates as advocated in neoclassical environmental economics. This is based largely on the risk of irreversible damage to ecosystems, something barely mentioned in neoclassical environmental economics. In this context, one of the major critiques expressed by ecological economists is that neoclassical theory, with its one-sided emphasis on marginal equilibrium analysis, is not prepared to account for the integration of complex phenomena, as required in the ecological real world.

Under the framework of ecological economics and steady-state economic models, there has been a series of publications on the subject of the post-growth economy or post-growth society in recent years. The following discussion focuses on selected fundamental concepts. In general, for proponents of the post-growth economy, it is all about the justification and configuration of a growth-free economy. One of the most important proponents of this is Tim Jackson from Great Britain. The central aim, in his opinion, is to achieve prosperity without growth, something he believes is not only fiscally and ecologically possible, but essential.

The post-growth economy focuses, especially, on stronger local and regional production and consumption. This refers, in other words, to a "small is beautiful" economy. A shortening of the value-adding chain reduces the structural pressure for growth in many ways. This enables a creative subsistence economy that will contribute to the strengthening of the post-growth economy. Another important criterion is sufficiency, which aims at achieving a decrease in consumption and requires a return to the essentials.

4 Overcoming the Controversy Between Neoclassical and Ecological Economics

The two approaches of weak and strong sustainability still stand in opposition to each other. Efforts were made relatively early to bridge the differences in the contrary positions. The contributions of Steurer (2001), for example, deserve mention (von Hauff and Jörg 2013, p. 130ff). This effort also includes the concept of "sustainable economics" as presented, for example, by Rogall (2012, p. 190). However, these approaches do not by any means present a uniform position. For example, while Steurer promotes strong sustainability, Hedinger tends to focus on weak sustainability. The approaches nevertheless combine the strengths of both concepts.

In this respect, it is appropriate to return to the category of vital natural capital. As already established in the two-step sustainability rule, there is no substitute for essential natural capital and it must not be endangered. On the other hand, the substitution of nonessential natural capital is permitted. The problem, as has already been mentioned, is in defining acceptable limits on the use of essential natural capital. The issue involves accounting for the unpredictability and risk, which is not always clear or easy to define.

At a minimum, an intact ecosystem multiplies the prosperity of humans and is therefore indispensable. Sometimes real and natural capital are substitutable and, in other cases, complementary. If this insight is applied to the central point of the controversy between neoclassical economics and ecological economics, the following becomes evident: Neither a general halt to growth (ecological economy) nor infinite quantitative growth (neoclassical economy) seems to be warranted. Pearce claims that growth, in addition to the many positive effects like the strengthening of the social security systems, stabilization of the labor markets, and the increase in government revenues with the associated greater scope for government expenditures on things like education and research, also facilitates efforts to preserve the environment for motivational, structural, and financial reasons (Pearce 1991, p. 11).

Through improved efficiency, frugality, recycling, structural improvements, and increased use of alternative renewable resources, it must be possible to decouple the two factors of growth and environmental quality from one another. Decoupling, for example, may refer to a rising GDP and a lowering of emissions. In this case, a clear target for the lowering of emissions (absolute decoupling) should be defined. The advocates of balanced sustainability promote an economic and ecological optimization. Balanced sustainability envisions a slowing of growth or a stop to growth solely as a potential result of the ecological restructuring of the society. In effect, the aim is for the harmonization of growth and environmental quality.

- ***Task:*** *Please discuss how the supporters of balanced sustainability integrate the two opposing positions of weak and strong sustainability.*

Considering some successful examples of the substitution of natural capital with real capital, it does not appear necessary to reject the substitution rule fully. There are some situations in which real capital can be substituted for natural capital (e.g., cultivated, managed forests). However, the idea of unlimited substitution, as

is permitted in the framework of weak sustainability, does not support the requirement for intergenerational equity. This is predicated on the unpredictable risk associated with the rising consumption of essential natural capital.

It can be assumed that technological progress will continue in the future, and new alternatives for the substitution of natural resources will be found. Nevertheless, there is no reason to assume with any regularity that technological innovation will be in a fundamental position to fully and equivalently replace natural capital. Consequently, every ecological function must have an "artificial substitute." For example, to substitute a forested area, fully equivalent functions must be provided. There can be no downside to the substitute that was not also present in the original (von Hauff and Jörg 2013, p. 131). The substitute must verifiably exist and not just be promised in the "escape avenues of technological daydreams" (Ott and Döring 2008, p. 156). If happiness and moral values are included in the equation, it may be assumed that future generations may not even want the substitution of nature. With that in mind, it can be said that strong sustainability leaves open more options than weak sustainability, and it gives future generations more "freedom to choose."

In summary, balanced sustainability takes on a mediating role in this debate, in which not only a constant total stock of capital, but, because of the limited substitutability of natural capital, many of the essential components of natural capital (climate balance, global life cycles, ozone layer, and balanced ecological system like forests, lakes and rivers, biodiversity, etc.) must also be maintained at a constant level. The maintenance of a minimum reserve is proposed for less vital stocks (Pearce 1991). It must also be acknowledged in this context that not all of the relevant information necessary to facilitate the identification and definition of clear limits on essential natural capital is available.

5 Conclusions

The sustainable development paradigm, which was introduced at the Earth Summit in Rio de Janeiro in 1992 and recognized by the world community as a paradigm for the twenty-first century, has been received with very different perceptions among experts in economic theory. It is possible to discern among the continuum of perceptions at least three different orientations and justifications. These are then further differentiated, but all fundamentally share a common starting point. Intergenerational equity is the common starting point, which means the ability of future generations to satisfy their needs should not be less than that of the current generation. However, departing from this starting point, we quickly come to a divergence of various perceptions.

The first reaction to the Club of Rome report "The Limits to Growth" became the neoclassical argumentation regarding sustainable development. This perception is largely characterized by the paradigm of weak sustainability. Of primary importance in this paradigm is the maintenance of a stable stock of capital (natural capital + real capital) for future generations. Consequently, it is quite possible that the result is a substitution process between natural and real capital. One variation in

weak sustainability is the two-step sustainability rule, which acknowledges a need to preserve some "essential stocks" of natural capital.

Ecological economics diverges at this point in that it clearly differentiates itself by fundamentally questioning the substitution rule. Accordingly, it promotes the view that the production of goods and consumption must be placed within the boundaries of the environmental system. If the limits of the ecological systems are exceeded, human existence is placed at risk. The economic sphere is therefore a subsystem of the environment. This became the basis for the paradigm of strong sustainability, which states that the relationship of the environment to the economy cannot be characterized by substitution, but rather is a complementary one. Daly proposed the steady-state economy, which is linked to the more recent concept of the post-growth economy. It promotes a growth-free economy, something which demands a very thorough transformation to a completely different economic system.

The opposing positions can be overcome under the terms of balanced sustainability. This proposes the existence of various ecosystems. In some cases, certain ecosystems are characterized by an essential stock of natural capital. No further claims should be placed on such systems. In other cases, there are ecosystems that hold a large and renewable stock of natural capital. It is possible to continue using these as a source of prosperity. To this extent, the relationship between the economy and the environment is sometimes characterized by complementarity and, at other times, by substitution.

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