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SUSTAINABILITY IN THE PRODUCTION AND CONSUMPTION

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UDRŽATEĽNOSŤ VO VÝROBE A SPOTREBE

ABSTRACT
Purpose
This paper aims to introduce the sustainability in production and consumption, and focus the different aspects of sustainability. The other is to find the possible way to the sustainable utilisation of natural sources.
Methodology
The methodological approach is mainly descriptive. The analysis will be based on relevant statistical data from secondary sources from national and international literature.
Findings
The new idea that builds on the recognition that the Earth is a finite world, the resources are not endless, and thus the vision of continuous growth cannot be sustained can be traced back to the 1960s. Global problems had already occurred by then, and trends calculated from the data indicated a rapid disaster for the future. Humanity is at a crossroads, and even the directions are still unclear. In the mid-1980s an increasingly ecological approach appeared in politics, development policy, and international institutions.

***KEY WORDS**: sustainability, natural capital, sustainable economy, social environment, natural environment*

***RESEARCH TYPE:** research paper*

JEL classification:
Q01 - Sustainable Development
Q56 - Environment and Development; Environment and Trade; Sustainability; Environmental Accounts and Accounting; Environmental Equity; Population Growth
P28 - Natural Resources; Energy; Environment

Introduction

Owing to the unstoppable population growth and the exponentially increasing energy consumption we have crossed the limits of the biological carrying-capacity of the Earth. It must be realized that we have come to the end of an economy based on the use of cheap fossil fuels. In this century humanity must return to the basics of life on earth and consider global challenges. Topic of the essay is current nowadays, because the population growth is increasing the use of resources. One part of these resources is limited, so we will have to find those possibilities which can substitute them.

Ecological thinking was fundamentally influenced by Rachel Carson's 1962 book "Silent Spring" which called attention to the polluting effects of chemical agents in a dramatic way. The American writer drew the world's attention to the importance of environment protection, and afterwards such problems had to be taken seriously.

The problems of the environment were first dealt with at the international level in Stockholm at the international conference of the "United Nations Conference on the Human Environment". The environmental impact of economic growth was carefully studied. The rich and poor countries saw the problems differently; the developed world held that the state of the environment was independent of the socio-economic conditions while the developing nations believed that poverty is a result of the deteriorating environment.

Economists, scientists, industrialists and public figures founded the Club of Rome in 1968. In 1972 the organization published the study "The Limits to Growth" by Dennis L. Meadows in which the authors illustrate possible versions of the future by means of a model (World 3). The authors then believed that by the unity of mankind harmful consequences could be avoided. (Heltai L., 2006)

The idea of sustainability was to a large extent spread by the United Nations World Commission on Environment and Development which started work in 1983.

Under the leadership of Norwegian Prime Minister Gro Harlem Brundtland the commission worked out a detailed political plan about sustainable development. The Final Report was published in 1987 with the title of "Our Common Future". The report dealt with energy consumption as a central problem.

The Commission's report had two main messages:

- poverty is the cause of the unsustainable world because the poor use their environment excessively,
- economic growth is necessary for the benefit of the poor so that there are resources available to compensate for the social and environmental problems.

Economic growth, however, means that more goods and services have to be created from less material and energy.[5] The shortcoming of the report is that it does not specify that the growth potentials depend on the carrying capacity of the environment.

Theoretical background

Humanity and energy

Nowadays population growth seems to be unstoppable as the number of the world population exceeded 7 billion in 2012. Since 1960 the population of Africa almost quadrupled, that of Latin America tripled, while the number of people in Asia has grown by -two and half times. According to the estimates by IEA – WEO (International Energy Association World Energy Outlook) (2012) by 2035 the population of the world will have exceeded 8,5 billion. Around 2025 the population of India will be larger (1,5 billion) than that of China. Figure 1 depicts the expected development of population growth. Over the past two centuries in Western countries the so-called modern demographic cycle went through all the phases. Europe's population increased fourfold, the number of births per woman fell from 5 to under two, the birth and death rate dropped from 35-40 per cent to 10%. Life expectancy increased from 30 years to 75-80 years. This change is called the "demographic transition". (Liui-Bacci M., 1999) Countries with high birth-rates will have to go through similar phases so as to stabilise their population but this will only happen in the distant future. Africa and India should implement the transition through a much shorter time, because the longer the transition the more unfavourable the consequences of the rapid population growth will be considering the conditions for development. (Birg H., 2005)Population growth is associated with an increase in energy demand. Changes in energy policy are inevitable, but even so the demand for energy is expected to increase by 1.2% a year and between 2010 and 2035 it is likely to reach a 30% growth.90 percent of energy demand growth is generated outside OECD countries, and fossil energy sources will be determining in the future. (IEA-WEO, 2012) It is expected that by 2035 their rate will decline from the current 85% to 71%, while the proportion of renewables will grow slowly from 13% to 18%.

Energy production

Energy production is increasing in the world today, for all energy sources. Within the primary energy consumption the use of oil and gas will decline slightly until 2050, but the proportion of coal, nuclear power, biomass and other renewables will increase. Reduction in the use of fossil fuels is not expected till 2050 while the proportion of renewables may rise to 18% by 2035. Different regions of the world show different production and consumption patterns. Asia and North America are in a leading position in the use of coal. Asia, North America and Europe are the largest consumers of oil. Europe and North America leads in natural gas consumption. World energy demand in 1980 was 7,229 million tonnes of oil equivalent (Mtoe) in 2008 it increased to 12,271 Mtoe. More 80% of the global primary energy demand is satisfied by fossil energy resources

Sustainable development

The term "sustainability" apperaed in the literature at the beginning of the 1980s. LESTER R. BROWN published his work "Building a Sustainable Society" in 1981. In a sustainable society, according to him,

harmony must exist among population growth, the financial needs of society, the utilisation of natural resources and the minimization of pollution.

The United Nations World Commission on Environment and Development (WCED) defines Sustainable Development as follows: "Development that meets the needs of the present without compromising the ability of future generations to meet their own needs". (Marselek S., 2012)

GYULAI (2008) explains that: "Herman Daly reveals the essence of development in the simplest way. He defines growth as an increase in size while development means to become better. *Growth means to become bigger, development to become better.*

Costanza, R. (1989) created a definition from an ecological point of view. In his opinion, *a condition is sustainable when the minimum conditions are provided for ecosystems so that they are stable and resilient. Sustainability is a relation between human economic systems and a more dynamic but normally slower changing ecological system in which:*

- *the survival of human life is provided in the long run,*
- *the individual has the possibility to ensure their own and their family's well-being,*
- *human societies and cultures are able to improve, but in which the effects of human activity are curbed so as not to destroy diversity, complexity, and ecological life-support functions"*

The principle of sustainable development nowadays has two interpretations (weak and strong). Weak sustainability means that social, economic and environmental considerations are equally taken into consideration in the decision-making process. This is shown in Figure 1.

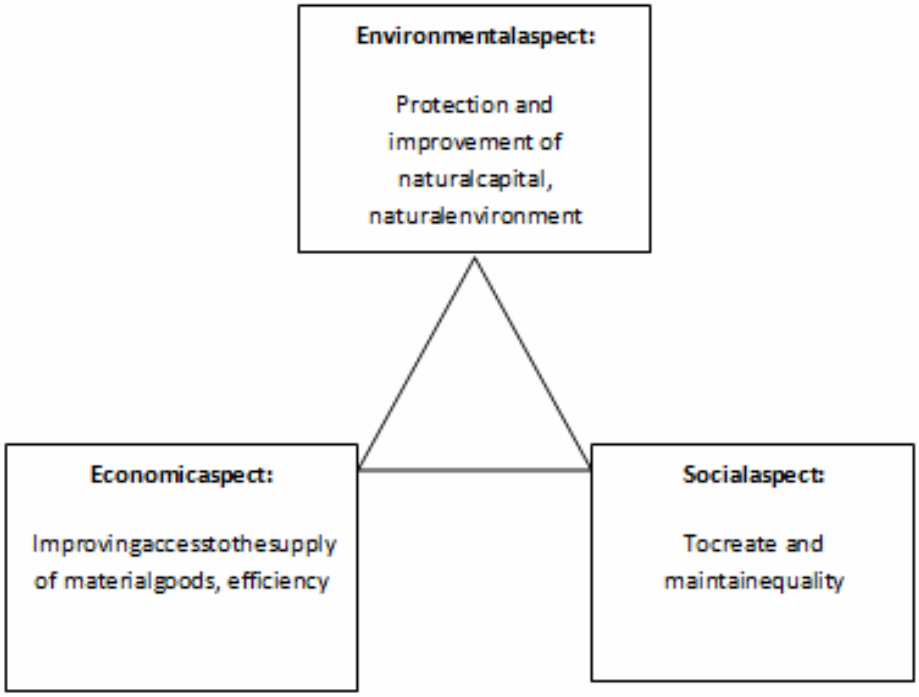

Figure 1: Aspects of sustainability
Source: Abayné Hamar E. – Marselek S., 2005

Another example of an ecocentric definition originates from the OECD, according to which: *Sustainable development is a development that does not harm the health of populations and ecosystems, and satisfy the socio-economic needs in a way that renewable resources utilised slower than the amount of time needed for their regeneration and non-renewables are used slower than the regeneration of renewable sources that can applied to substitute them.*(Csanády R. A. – Kovács E., 2003; Kelemen E., 2013)

The weak sustainability criterion states that the total value of natural capital, human capital and that of the man-made goods as capital cannot reduce over time. This idea assumes the unlimited mutual substitutability of capital goods and creates the necessity to financially assess nature which is reflected by the applied tools (e.g. the

internalization of externalities).[12] The shortcoming of the theory is that it does not count with the undoableness of the changes caused in the ecosystem. (Málovics Gy.,2007)
In the case of strong sustainability the external environmental constraints must be abided by as such, which means that the emissions must not exceed the environment's capacity to absorb, the use of renewable resources must not exceed the rate of formation and the use of non-renewable resources must not exceed the rate at which sustainable and renewable substitution occurs.

Sustainability concepts may be approached from an environmental-economic and an ecological-economic point of view. The two directions can be interpreted as two paradigms with different conclusions. (Málovics Gy. – Bajmóczy Z., 2009)The differences are shown in Table 1.

Table 1. Comparison of weak and strong sustainability

Weak sustainability – (neo-classical economic approach)	Strong sustainability – (ecological economics approach)
The focus is on the marginal cost analysis as system necessary for decision-making - the significance of absolute measure is small.	The focus is on the level of matter-energy throughput.
The financial analysis of changes in natural capital is significant.	Financial analysis is negligible.
Discounting and the current values are central to the assessment; it focuses on efficient resource allocation between periods.	Discounting is generally discouraged; focus is on resource allocation between correct periods and the rights of future generations.
The prices are the decisive signals of relative rarity.	Prices are unreliable because of the multitude of externalities.
Technological progress is seen as the main factor of periodically acceptable growth.	Technological progress is not seen as cure for everything, rather as a factor that carry and cause environmental problems.
Utilitarian approach to values.	The approach to values is based on rights.
The present generation ensures sustainability by retransferring the same entire capital stock.	The present generation must preserve the natural capital stock for the future.
The economists focus on the *steady state* when analysing dynamic behaviour and natural resources management.	The focus is on threshold effects, uncertainty, irreversibility, and flexibility.

Source: Szlávik J., 2007; Hanley – Shogen – White, 2007)

Sustainable development strategy is a long-term program for humanity. However, beside a global level implementation has national, local and micro-regional ones as well. Local levels have a crucial role in realising the objectives.

From the point of view of efficiency it is very important to distinguish the levels and areas of sustainability. (Csete L., 2005)Global and long-term principles of sustainable development often unfold in the regional and local programs, which may be organized, regulated and controlled by the authorities of a given a level. It is possible at this level to mobilize, persuade and teach people to be responsive to sustainable development. (Marselek S., 2005)

Research results and findings

Sustainable production and consumption

Sustainability comprises of production and utilization that are sustainable from environmental, social and economic aspects as well as of the highest level of energy efficiency that current technology allows.
To this end along each of the pillars of sustainability the conditions set out in Table 2 must be satisfied in the process of production and utilisation.

Table 2.Conditions for sustainable production and consumption

	Environmental conditions	Social conditions	Economic conditions
Production	Sustainable production	Consideration of the needs of local communities	Profitability
	Energy efficiency, crop selection and production technology suitable for local growing conditions	Consideration of landscape and recreational needs	Flexible production structure
	Protection of natural habitats		Solving hold-up problems
			Ensuring competition
			Economies of scale
Logistics	Minimisation of transport	Utilisation of the mode of transport that least disturb local communities	Efficient and safe transport
	Utilisation of the least polluting mode of transport		
Processing	The most appropriate technology concerning energy efficiency and environmental protection	Consideration of the needs of local communities from the point of view of energy autonomy and job creation	Profitability
			Economies of scale
			Capacity utilization
Utilisation	Infrastructure that is least burdensome for the elements of the environment and natural habitats and that considers energy efficiency aspects	User-friendly technology	Affordable technology
		Awareness-raising for energy use	

Source: Ministry of Environment and Water, 2007

LÁNG (2003) believes that sustainable development is based on three pillars. The Stockholm Conference created the natural environmental pillar, the Rio Conference brought the economic pillar to the forefront, while the Johannesburg Conference emphasized the social pillar.

The problems of sustainable development are system-based. Answers to local challenges cannot be provided without the knowledge of the wider context of global processes.

The changes can only be durable only if a sustainable economy is realized. A sustainable economy is able to mobilize new resources thus it is possible to expand the resources. Within a society the state must meet and secure the actual needs of the people. "*The Earth can satisfy everyone's needs, but cannot satisfy everyone's greed*." Today there is enough food for all the inhabitants of the world; everyone would have enough if distribution was equal. Nevertheless, 900 million people go hungry every day and 2 billion people suffer from chronic malnutrition. Every year 18 million people die from hunger-related illnesses. (Magda R., 2013)

It can be stated with confidence that if pollution reaches serious levels through the course of production and consumption, it will have a direct negative impact on the production conditions (costs) and also on the level of consumption (diminishing welfare). Therefore, for its own interest, the state is to accomplish economic regulations that help create sustainable system of relations between mankind and nature as well as between the economy and the environment.

WACKERNAGEL – REES (2001) report that: *The analysis of the ecological footprint is a calculation tool that allows the estimation of the resource consumption and waste processing needs of a defined human population or economy measured in fertile land space*.

Every human being and society occupies some space on the surface of the Earth by creating the necessary goods to sustain life, and by having the nature process wastes that are released. The size of this area is measured by the ecological footprint. It is appropriate to compare the ecological footprint with the biological capacity (available land). The difference between the biological capacity and the ecological footprint is the ecological deficit, which explains to what extent our activities are passed on to future generations. Factors affecting sustainability are shown in Figure 2. (Gebhardt B., 2006)

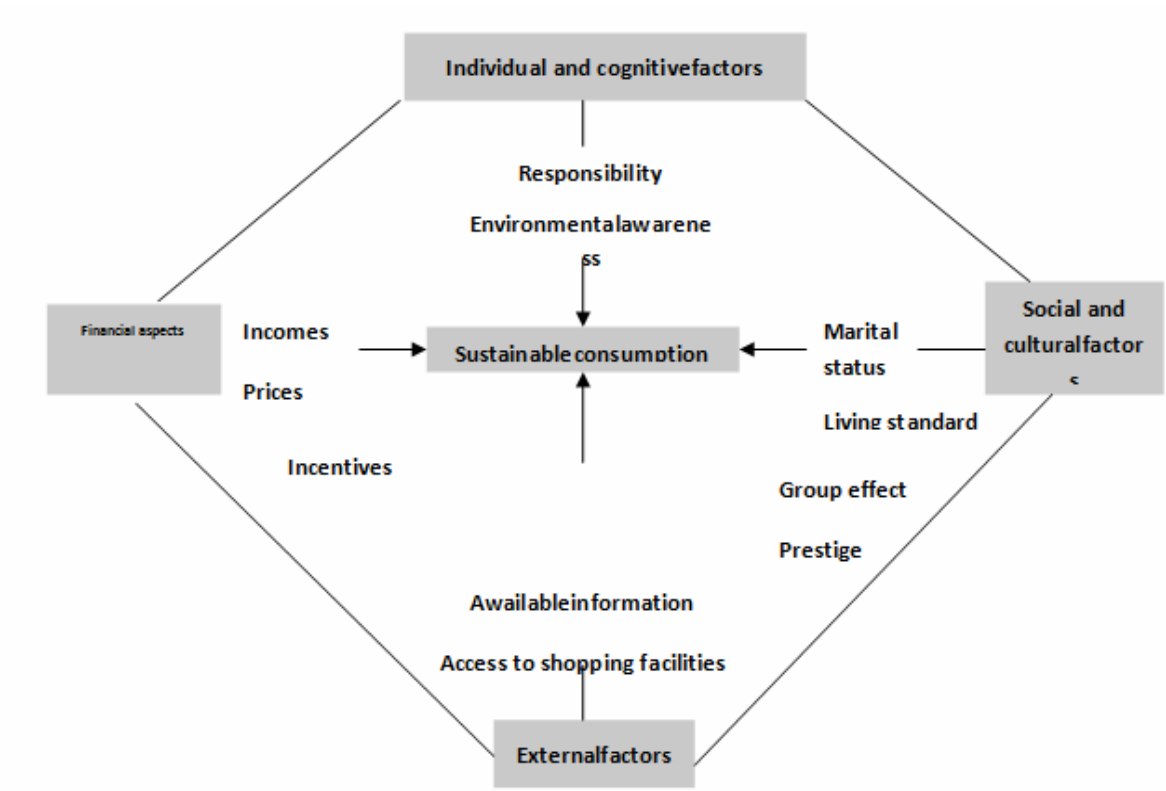

Figure 2: Factors influencing sustainable consumption and behaviour
Source: Gebhardt B., 2006

GEBHARDT (2006) integrated into a model the relevant factors which, on the basis of his studies in Germany, have a considerable impact on sustainable consumption. According to the model four factor groups are significant (Figure 2).

- *External factors:* the place of purchase of organic food, popular eco-products.
- *Financial factors:* income, the share of purchased organic food, their perceived premium price.
- *Cognitive and individual factors:* Motivations for selecting eco-products, risk sensitivity, health awareness in food purchase decisions, as well as awareness and confidence in the authenticity of the product.
- *Social impacts:* the influence of opinion leaders, the effect of the immediate environment, the protection of children by means of organic food.

The need for a new paradigm of development was recognized in the mid-1980s. The UN declared the second and third decades of development a failure because they had proved to be unable to break the cycle of poverty which evolved in the worst and poorest developing countries of the world.
Today the situation in this respect is very bad. The balance would require a 1.5 Earths and the size of the land that indicates unsustainability is growing rapidly (with the current rate of development 2.4 Earths are expected to be needed by 2050). Consumer could help the situation by making choices in a conscious way but environmental awareness is still very weak.
One of the lessons of the energy crisis of the early 1970s is that the traditional, mostly fossil fuels are scarce and limited thus their use requires extremely high level of rationality. We must strive to become familiar with the new and renewable sources of energy and their use, and also to continuously improve the balance of foreign trade. The proper management of energy sources and increased energy efficiency are particularly important in connection with competition. International competitiveness of a country means – among other things – how the available resources and assets are managed amid global competition. (Bozsik N., 2004)
The majority of people are not aware of how fast we consume natural resources. Waste is produced much faster than we could recycle it.
Our world is currently using far more resources than what sustainability would allow. Consequently, the current economic system can work only with significant additional resources. If these resources become exhausted, the

economy could be seriously jeopardised. 87% of resource consumption is based on fossil fuels, so their decrease represents the greatest risks. One of the great challenges of our time in all countries of the world – including Hungary – is how to substitute these energy sources so that the environment is damaged to the least possible extent and thus sustainability is ensured.
The criticism of the dominant traditional development paradigm has become universal: in all areas of development and in all disciplines.

What principles should be taken into account to achieve the changes? The main ideas are as follows:

- Responses to local challenges cannot be formulated without knowledge on the wider environment and on the global trends.
- Sustainable development integrates every aspect of the environment, the economy and society.
- Sustainable development is nothing more than the sustainable management of resources, which leaves resources for future development.
- The principle of precaution (e.g. genetic engineering) must be respected.
- Previous production practices should not be forgotten so that we can get back to our roots.
- Local resources are to be utilized.
- Diversity is to be maintained (e.g. biodiversity).
- Non-material values are to be preserved. Drinking water, clean air, the cultural landscape, the pollution-free environment are all necessary for our existence while their value cannot be expressed in financial terms.
- Natural resources are to be used and preserved at the same time.
- Decisions are to be made at the local level.
- Sustainable development should be a varied system made up of small elements of organizational and economic units. The economy consists of small economic units linked to individual and communities. The organisation made up of many micro-organisms can function as a macro-system.

Conclusions

The previously existing harmony between mankind and nature has ceased existing, the Earth's resources are finite, the exponential growth presents a deadly threat to our planet's wildlife. In countries with growing populations the severe lack of water and food can lead to the total destruction of the social order. The population of megapolises has increased tenfold over the past forty years, in 2013 there were 23 cities whose population exceeded 10 million. The excessive consumption of freshwater and soil erosion make the possibility of a further rapid increase in food production dubious.

By the use of fossil fuels 90 million tons of pollutants a day is emitted into the thin layer of the planet's atmosphere, which acts as a heat trap and accelerates global warming. In order to be able to combat the climate crisis humanity should take immediate, significant, and coordinated actions, but it has not happened yet.

Should these processes remain unchanged, a significant extinction of species may occur, which was solely triggered by human activities. If we do not want to ruin the future of our children and grandchildren, any new era of economic growth must be less energy intensive.

The globalization of the economy was followed the globalization of environmental problems and thus no national issues exists today. This means that international cooperation is vital. National Environmental Action Plans define our country's environmental vision for the future in the interaction of the four basic resources (human, social, natural and economic).

In the current situation the preservation of biodiversity is an essential task of mankind. Biodiversity is the basis of our existence since it provides essential ecosystem services for human life, it provides the ecological foundations for healthy food, clean fresh water, and clean air.

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