# SUSTAINABLE DEVELOPMENT IN "THE LIGHT AND SHADOW" OF GLOBALIZATION

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Abstract: Nature needed millions of years to create coal reserves corresponding to one-year global consumption. Contemporary transport, production and households can quickly absorb the oil reserves that have been created in nature for millions of years. The vast majority of countries have signed up to the principles of sustainability of life on Earth (sustainable development) at the 1992 World Summit on the Earth Summit in Rio de Janeiro. This meant that human society either has to start to regulate production and consumption effectively, or be ready for an imminent catastrophe. The European Parliament later defined sustainable development as follows: "Sustainable development means improving the standard of living and well-being of people within the limits of ecosystem capacity while preserving natural values and biodiversity for present and future generations." (European Parliament and Council Regulations 2493/2000 and 2494 / 2000). It can be said simply that sustainable development will be ensured by a society that only uses increments, it will take care of minimizing emissions of pollutants, and it will not leave non-mineralized or non-immobilized waste in the environment. Sustainable development = Consumption only + Emission minimization + No non-mineralized waste. Sustainability can therefore be achieved by replacing non-renewable energy sources. Consumption of water, food, building materials and consumer goods per person is today ten to thirty times higher than at the beginning of human existence (Odpad je Energie, 2016). Most people have a living goal to live well and not to save energy or produce less waste. Waste production is linked to the existence of every company even in a globalized world. Experience with advanced waste management states shows that the growth of waste can be stabilized. Experience also shows that functional protection of the environment can be found from human influence on nature. The article shows in three concrete examples that the Czech Republic also focuses on the utilization and treatment of waste in practice and it restricts the growth of its production also from the point of view of scientific research international cooperation.

Keywords: Globalization, sustainable development, production chain, production, waste.

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# 1. Introduction

The economic Czechoslovak reform in the 1990s represented the transition from a centrally managed economy to a market economy. Radically changed economic conditions (the transformation of the economy) affected not only business and institutional spheres, but also society as a whole. These changes took place under the influence of the process of global change in the world economy. This process, generally called globalization, touched each individual in society directly or indirectly. (Da Silva et al., 2017, Goldberg and Pavcnik, 2007, Ignatius, 2017, McMichael, 2013)

The rapid development of production at the turn of the 20th and 21st centuries has brought considerable comfort for man by developing and using modern technology gradually in all areas of society. This comfort has manifested itself in the sense of satisfying (or not satisfying) the basic, luxurious and evolving needs of each individual. This leads to a constant increase in production and consumption to the consumer society. (Shaikh, 2017) Globalization trends, a desire for increased social status, and aggressive advertising affect the customer in purchasing decisions. It has its pros and cons. On the one hand, it creates conditions for higher (mass) production - overproduction (higher profits for businesses) and leads to economic growth. On the other hand, people do not just buy what they need. But they also buy what they do not need and what brings them pleasure (alcohol, drugs) and happiness. This is also often linked to debt and worsening health (Hes, 2014).

Is this comfort, which often leads to waste, in line with the sustainable development of society in the process of globalization of the world? Sustainable development is closely related to raw material extraction, production, distribution, sale, purchase and consumption. The responsible approach of each entity (from raw material extraction, primary producer to processors, distributors, retailers to final consumers) is becoming in a logistical chain of mining - production - consumption as an important determinant of sustainable development. (Chazdon & Uriarte, 2016, Kriegler, 2017, Van Vuuren et al, 2017)

A number of experts (Urbaniec et al, 2017, Foukis et al., 2017, Whalen et al., 2017), authors of scientific research, and now also politicians dealing with "sustainable development" draw attention to the individual pitfalls that bring about constant economic growth. Already in the 1980s, Jaroslav A. Jirasek (2006), in the book Agenda of the Next Year, took the development of the economy in the second half of the 20th century with disturbing extremes at the expense of nature. The "Rome Club" has persuaded the UN to make a decision to end the growth constraint in the 1980s. It failed. However, reports of growing problems have prompted scientists, practitioners and technicians to find more efficient technologies - to make more use of fuels, raw materials and "waste" and to recycle used materials. The world has become aware of the critical state of nature and its importance for sustainability and the existence of life at all. The document entitled "Sustainable Development" was then adopted in the 1990s at the World Summit in Rio de Janeiro.

## 2. Methodology

The current global trend of economic growth leads to a steady increase in production (to overproduction). It also allows for the growth of consumption and it often leads to waste (Regnerová, Šálková & Regnerová, 2016), generally to the consumer society. The aim of the paper is to show whether this global trend of constant economic growth is in line with sustainable development in selected areas: scientific, wine, and agricultural.

The available scientific and scientific works from domestic and foreign literature, the materials of the institutions and organizations whose activities relate to the subject matter were used to fulfill the task set by the target. All sources used are listed in the literature.

The issue of scientific knowledge and the analysis of acquired data from scientific literature (economic theory) has been methodologically linked to data based on the knowledge of subjectively structured knowledge according to the importance of the studied subject (current trends and key changes in the production process). The approaches and procedures of scientific research are based on knowledge organized according to the paradigmatic criteria. They are systemically communicated primarily in written form, as reported by Hendl (2012). Analytical

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analysis was carried out from data obtained from internal and external research, which were previously obtained. In addition, the pairs of general methods were used: analysis-synthesis, induction-deduction and a specific comparison method (comparison of the conventional and green production chain). The coupled induction-deduction categories were used to find out whether regularity or irregularity of the phenomena under investigation (utilization of waste from production in winemaking, processing and utilization of waste in agricultural production) can be derived from the general rule applicable to phenomena in another field, elsewhere in another time

## 3. Results

One of the world's author and analyst of global development, Jeffrey D. Sachs (2008) presents in the book *The Age of Sustainable Development*, a convincing and practical framework for how people can use the global path. The issue of sustainability and sustainable development according to this author is a way of looking at the world with a focus on the context of economic, social and environmental change, but also the possibility of our shared desire for a decent life that allows for economic development, social interconnection and environmental sustainability. In a simplified way, we can understand sustainable development as a certain analytical theory as well as the normative or ethical framework of this theory.

Business entities in the production process produce their products with which they enter the market. The production process can be implemented through a conventional production chain or environmentally friendly circular production scheme - a "green production chain" process. The distinction between conventional and green production chains is a qualitative change in the whole production process. (Zaman & Moemen, 2017)

Utilization or further processing of waste arising from the raw material phase to consumption in the production chain is very important for sustainable development. Why? The principle of sustainable development is based on three pillars of sustainability: to reconcile the economic, environmental and social aspects of each development program. And just waste production is one of the major problems of postmodern society development. Sustainable development as a guiding principle of environmental policy is reflected in sectoral policies (energy, transportation, agricultural, industrial). (Varvažovská & Prášilová, 2015)

#### 3.1 Production chain

The production chain generally includes all steps and their impacts starting with regulatory requirements, production standards and material resources to final consumption. It is necessary to include in the production chain not only energy sources, but also to ensure decent conditions for workers, to eliminate negative externalities of transport, to plan what will happen to the product, and to what happens with waste and surplus production.



Source: http://udrzitelny-rozvoj.cz/clanky/co-je-to-zeleny-produkcni-retezec

The conventional production chain (Fig. 1) is a substantially linear production process scheme. This scheme was not problematic until the Industrial Revolution, which allowed sufficient production capacity and knowledge in the field of chemistry. On the one hand, economic growth, on the other hand, negative. This growth has developed at the expense of nature and the increasing amount of waste. The Industrial Revolution has allowed for a faster production process on a large scale. Natural wealth seemed to be infinite. Whether this approach has (not) a negative impact on nature in the long run has not been taken into account. The large amount of raw materials available, many forests and watercourses indicate that the planet Earth is rich. There was no need to create any other, closed, circular system.

Green production chain (Fig. 2) represents a circular economy and as a concept it is an integral part of Sustainable development<sup>1</sup>. We have to think about the impacts that we will produce at all steps of the green production chain. It is therefore a qualitative change (not only partial) from regulatory requirements over the economic, social and environmental objectives of the society (including decent conditions for employees, renewable energy sources and transport externality) to final consumption. We can not only draw natural resources and produce irrespective of what about surplus production, what with long products. And especially what we will do with waste generated in the different phases of the production chain from development, production to consumption.

<sup>&</sup>lt;sup>1</sup> Sustainable development as a continuous process representing the balance of economic, social (including ethics) and environmental aspects of life prosperous society that will gently use its resources (own and imported). Sustainability is not a target state, but it is permanent process in which it is necessary to deal with the most pressing and actual.

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Source: http://udrzitelny-rozvoj.cz/clanky/co-je-to-zeleny-produkcni-retezec

It is a problem in product development and design ('design problem'), as stated by Braungart and McDonoughem (2002), based on the basic principle of circular economics - the Cradle to Cradle principle. (Wang, Li & Kara, 2017) Materials and products that are in use today have not yet been and are often not always designed and developed with the idea of using them repeatedly For example, water in the food industry (Sekoulov, 2002). Furthermore, when packaging is disposed of as waste where landfills or incinerators still prevail

Nowadays, it is a necessary and inevitable scenario. It has to be proposed in the development and design of products, materials, processes and technologies to be destined for recycling (Cradle to Gradle, 2015):

- Combination of natural and synthetic materials so that they are easily detachable.
- Repeated recycling without major loss of quality.
- Content of safe materials and chemicals, without toxic or carcinogenic substances.
- Prioritizing clean, renewable and CO2-free production.

## 4. Discussion

The Cradle to Cradle principle consists in the continuous recycling of materials in the production chain in two separate cycles:

- natural materials in the natural cycle, the use of biosphere waste (for example, as nutrients
- synthetic or technical materials in the technical cycle, recovery of waste for technosphere (eg for reprocessing).

Both cycles are subject to professional and scientific research and they are implemented and put into practice in some disciplines. However, the current system has a number of shortcomings, which need to be addressed from research to implementation. (Roux et al, 2017)

#### 4.1 Packaging as waste and its use

Packaging durability is generally a major problem in the current production system. A packaging, such as plastic, fulfills on one hand many important functions that need to be taken into account when developing the material for packaging and design. It is also important to consider that the packaging, on the other hand, becomes waste. Therefore, it is necessary to take into account how it will be treated as a waste at the stage of packaging development and design. Whether we only recycle, renovate, reuse or layout on input materials. The current way of 'recycling' or disposal of waste is imperfect for the environment, and it is undesirable for a long-term.

Pollution of the landscape by plastics as waste is one of the most important problems facing contemporary society in relation to the environment. The Czech invention will help to reduce these risks in a country where, due to rapid economic growth and high population, waste production is steeply growing. The Czech-Chinese project Hydal enters a new stage, which means the construction of a pilot production line (currently undergoing the transfer of Czech biotechnology) that produces bioplastics and the so-called PHA biopolymer.



Source: http://www.businessinfo.cz/cs/clanky/ceska-firma-vyvinula-unikatni-metodu-ktera-pomaha-rozkladat-plasty-uplatneni-najde-v-cine-82436.html

PHA are natural polyesters, insoluble in water and high temperature moldable as well as most synthetic plastics, so-called thermoplastics. PHA is a general term for a wider group of substances and therefore may occur in various forms. PHAs are primarily non-toxic and nature compatible, and therefore approved as substances that can be used in food and medicine. Their breakdown takes, according to the application, weeks to years. They decompose into CO2 and water and they will blend in so completely with the environment.

Suzhou Hydal Biotech joint venture with Nafigate Corpration, China's Jiangsu Cleanet, aims to build capacities for producing PHA biopolymer together with agricultural foil production. China, as the world's largest consumer of agricultural foil, has tremendous problems with synthetic plastic foils. The foil will be replaced by **biodegradable**, which will fall apart in the fields (within 180 days) and they will not cause any ecological pollution. Hydal biotechnology utilizes **used frying oil** as a source for the production of PHA biopolymer and bioplasts. China is a big consumer of frying oil and used would become waste. This is very unfavorable and dangerous for nature.

## 4.2 Wasteless Winery

Grape Vitis (Latin Vitis vinifera) is a cultural plant. Its cultivation has been used for the production of juices, wine and other spirits since time immemorial, for the consumption of matured sweet fruits as a fruit and for drying (raisins). In some countries, the leaves are wrapped in dishes, especially rice. Products made from grape vines have always been used as medicinal and health benefits, says Kovář (2008).

Winery is a classic example of the circular economy (using the "green production chain" system) in practice. A wasteless economy that is in line with sustainable development is fully implemented. Many by-products, which at first glance represent the waste, arise from the processing of grapevine. Winery is an important example of multi-purpose and maximum use of waste. It is an evaluation of all products (wine, musts, grape marmalades, but also oil and grain from wine grape seeds and others) when processing vine, they would otherwise be waste. These products bring not only economic, but also social and environmental significance, as Muňoz et al (2014).

Wastes arising from the production of wine as a major product and its use in the production chain (husks, seeds):

- Wine spirits brandy made by burning fermented wine or wine grains by distillation of fermented wine grain (the most famous are the Italian grappa eg brands Alexander, Barbero, Paganini and others and French Marc).
- Wine seed oil of cold-pressed grape seed from red grape seeds. They are obtained mechanically from the matolin, they are separated and cleaned. They are pressed at an optimum humidity of 5-7% in special presses and then the product is filtered. Usage is very broad in nutrition, healthcare, cosmetics, etc.
- Flour is usually made from the remaining raw materials after cold pressing of the oil, it is dark brown in color. The use is, as with wine oil, very wide. It helps to stabilize the level of insulin and sugar in the blood, it is added in a small proportion to standard flour due to the high concentration of active substances.
- Some processed waste produced in wine production forms the basis for the production of supplements for healthy nutrition and for cosmetic and pharmaceutical purposes.
- Anthocyans are other important products from wine grape waste. They are functionally used as a textile dye and extracts from red grapes are, used as dyes in the food industry.
- Further for the production of livestock feed (matolin solid residues of grapes) or for biomass and for composting (Ruggieri et al., 2009).

Wastes arising from certain parts of the wine vineyard plant are, used and processed, in addition to the products mentioned. They are most often used as bioenergy raw materials for incineration and heating (Regnerová, Šálková & Regnerová 2016).

We can encounter a similar process of utilization of waste in the planting of apples, pears, processing of stone fruit waste and vegetables in the field of vegetable growing, including the waste arising from some parts of trees and plants.

## 4.3 Specific use of waste in agricultural production

Agricultural production (primary production) - both plant and animal, has its own specificities, which are based on its biological basis. It is therefore necessary to dispose of agricultural biodegradable wastes (with biological basis) bearing the BRO designation in a natural cycle, that is, to use the product or waste for the biosphere (energy source). An example

is biomass and its use for electricity generation and as raw material for high quality gaseous and liquid fuels.

Biomass obtained on areas of otherwise unused land: abandoned agricultural land, low productive land, and "resting soil" (ie the remaining non-productive land) as reported by Hoogwijk, M. et al. (2005) can also be used as renewable energy sources in the future. A number of experts and scientific research centers are engaged in the use of biomass in the world. Article by Demirbas (2007) Sustainable Biomass Production aims to estimate, identify and evaluate the biomass production options, estimate the sustainable biomass production for energy, and estimate the energy potential of biomass production in Turkey.

The agricultural economy is a typical example of a closed cycle (circular economy). Processed crop and livestock products have become food for humanity. Food is currently very wasteful in some developed parts of the world. Only Europeans will throw in containers up to 89 million tonnes of unused food every year. Often, these are health-conscious goods. In a number of countries, we are already talking about the fight against waste. (Šálková, Regnerová & Hes, 2015)

Plants in both raw and processed form became feed for livestock and served as litter. Feeds from animal production (waste) have again become fertilizers that return nutrients to the soil. Manure or slurry was not considered as waste but as a **valuable organic fertilizer**. Cycle soil - plants (including grain) - feed - animal - faeces (manure) - land naturally closed and this is a specific example of the green production chain. And as such, it should be preserved in its entirety. It is often underestimated or underappreciated by other fields – non-agricultural. (Odpad je energie, 2016)

Livestock production in agricultural production in connection with the EU Common Agricultural Policy has declined significantly in the Czech Republic. This resulted in a decrease in manure (animal waste), which negatively affected the soil structure and plant production. Multi-year forage crops such as clover and alfalfa, which naturally improve soil fertility by fixing nitrogen air, are less cultivated. In addition, underground root and over-ground plowed biomass (ideal for the development of soil microflora) significantly contributes to soil protection from erosion. The erosion of agricultural land has increased in recent years and caused considerable damage due to the widespread cultivation of highly profitable plants (maize, rapeseed).

Another example of using waste-residues from crop production is the production of pellets as fuel or composting. By composting it is possible to obtain humus substances and put them back into agricultural land.

Manure as a solid farm fertilizer is produced by fermenting a mixture of solid and liquid excreta (waste) of livestock and bedding, which may be straw, sawdust or shavings. Due to the high nitrogen content, manure is a valuable fertilizer. Agricultural land fertilized with high-quality manure perfectly binds nutrients and grows success. At present, both "farmers" and "gardeners" return to manure. Why? Manure can do what man-made fertilizers can never manage. (Organické hnojení, 2012)

#### 5. Conclusion

The qualitative change of the production chain is too big and difficult change for a number of companies. For other companies, this is a necessary challenge and for the environment and society of people it is the future and the life-long need. Cradle to Cradle is essentially a system of how to create a better world. Enhanced circular economy and social responsibility, the world without waste is more than sustainability. This enables sustainable development of society even at times of major global changes and influences to local circumstances. Qualitative changes in the production chain that determine sustainable development are the impacts - the "light" of the globalization process on a society in which humanity can live in and without waste. When we remain in the position of negative impacts of mass production and sustained economic growth on the environment, destruction of nature and thus living conditions for people, it will be a deep "shadow" of the globalization process on human society.

All waste can be used - either for biosphere (for example, as nutrients) or for technosphere (recycling and utilization of technical and synthetic materials). Can we realize this ideal idea? We certainly can, but it requires a radical change not only in technology, but also in people's thinking and attitude.

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