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Circular Economy in the Czech Republic

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Abstract **- The paper's goals are: 1) to study the circular economy (CE) concept implementation in Czech enterprises; 2) to investigate the awareness of young generation to CE concept, its possibilities and benefits. The study of good Czech practices confirmed that there are eco-innovative companies introducing the creative environmental, ecological and social responsible solutions, but the examples are still limited. The findings revealed that CE in Czechia is implemented mostly with "bottom - up" approach i.e. from the level of several business entities and non-governmental institutions. In order to determine awareness the primary research with quantitative and qualitative data analysis is focused on Y-millennial generation. The results indicated that the younger generation has limited awareness and poor understanding of the CE programs and business practice. The practical implication of findings and some recommendations to education and government are introduced.**

Keywords - circular economy, cradle-to-cradle, young generation awareness

I. INTRODUCTION

A circular economy is an alternative to a traditional linear economy (make, use, dispose) in which we keep resources in use for as long as possible. Today circular economy (CE) is a radical new thinking and method of how we make and use things and the way of how our economy works. However, there are different points of view in a literature of what constitutes the Circular Economy approaches. CE is associated with a variety of concepts, including industrial ecology, waste management, cradle to cradle as relatively new one approach. Transition to Circular economy strongly connected with sustainable development; it will be the main predisposition and responsibility to manage change for present and future generations. Therefore, getting a common of the CE concept, is crucial not only for science and business, but for education. The circular economy is the subject of great attention in EU programmes. As suggested in the Reflection Paper Towards a sustainable Europe by 2030, " the circular economy should be made a backbone of the EU industrial strategy, enabling circularity in new areas and sectors, life-cycle assessments of products should become a norm and the eco-design framework should be broadened as much as possible [1, p.22].

Concept of circular economy is slowly entering into the Czech Republic. However, it is still a bit behind with more developed Western countries [2]. While CE has become a part of the government programs in the Czech Republic, the activities of the Czech executive bodies and the first practical results are not very encouraging. As a result, we can assume that there is no high level of understanding the concept, the knowing of good practice examples of Czech business and, consequently, it is the low awareness of its benefits for society, especially among the young generation, as we can see them as "CE" trainees. Our research study based on the hypothesis, that today the awareness of people and practical applications of CE in the Czech Republic are not at a high level as it should be. The main goals of the paper are: 1) to clarify the different definitions and approaches to CE, getting a common understanding its concept; 2) to analyze the level of CE implementation in the Czech Republic; 3) to study awareness to CE among the young generation; 4) to give some recommendation to business, education and government.

II. LITERATURE REVIEW

The concept of a circular economy has been discussing since the 1970s. This is influenced by Boulding's work [3], which describes the Earth as a closed and circular system. The industrial ecologist Stahel defines a circular economy as one based on a spiral loop system founded on reuse, repair, reconditioning and recycling [4]. The literature review on CE theoretical approaches confirms that: "there is no commonly accepted definition of circular economy" [5, p.5]. The definitions of CE contained a broad spectrum of principles and proposals that have been formulated in the last decades from "industrial ecology" [6], dematerialization, increased productivity, 3R principles (Reduce, Reuse, Recycle) and product life extension. In some cases, the circular economy concept is understood as responsible recycling or effective and efficient waste management [7]. The most comprehensive study in conceptualizing the circular economy was presented by Kirchherr et al (2017), where they gathered and analyzed the 114 of CE definitions, which coded on 17 dimensions. [8]. Most of them rooted under the umbrella eco-efficiency strategies, focusing on maintaining or increasing the value of economic output, while simultaneously decreasing the impact of economic activity upon ecological systems. Braungart et al. (2006) recognized the potential of eco-efficient strategies in the short term. Meanwhile, they argued that eco – efficient strategies are addressing problems instead of the source and, therefore, are insufficient to achieve the goals in long run. In their books, McDonough and Braungart, while introducing new concept Cradle to Cradle or (C2C), they called for a new eco-effectiveness, as the way of designing material good [9].

More recent theories such as biomimicry (a study a study of emulating and mimicking nature, developed by Benyu [10]; Cradle - to - Cradle [9]; blue economy by Gunter Pauli [11] have contributed to further develop the concept of CE. These three philosophies formed under the obvious principle that man is a part of nature, who coexist, adapt, learn and emulate via nature. Therefore, the Nature-Inspired Design Strategies are created which provide principles and tools for design practice in many spheres from urban environments to additive technologies and bionic cars.

We convinced that Ellen MacArthur Foundation presented the most prominent definition of circular economy, related to these new approaches, which reads: "[CE] an industrial system that is restorative or regenerative by intention and design. It replaces the ' end-of-life ' concept with restoration, shifts towards the use of renewable energy, eliminates the use of toxic chemicals, which impair reuse, and aims for the elimination of waste through the superior design of materials, products, systems, and, within this, business models." [12, p.7].

The most elaborated concept is Cradle - to - Cradle or C2C. It describes a waste-free system in which all materials are a permanent part of natural cycles or closed technical cycles. The basic of Cradle - to - Cradle Design (*Cradle to Cradle*®) is to distinguish the inputs used in two groups. The first group is of organic origin, they are either reusable or degradable and return to the biosphere; the second group represents technical materials, which are inorganic or synthetic inputs that need to be stored after the product is overloaded and a useful substance extract and reuse, eliminate or minimize any unused waste. Thus, the main idea of C2C model is that all materials used by a person with a continuous life cycle circulate in appropriate circles depending on their origin. Possible materials for such cycles include, along with glass, compostable textiles, fully reusable raw materials, and pure plastics or metals that can be used an unlimited number of times for the same purpose. The term Cradle to Cradle is a registered trademark of McDonough Braungart Design Chemistry (MBDC, 2015). According to the Institute, the Cradle to Cradle Certified Product Standard is a guide for designers and manufactures recommending to look at product through five quality categories:1) material health and safety; 2) material reutilization, such as recycling or composting; 3) renewable energy and carbon management; 4) water quality and stewardship; 5) social fairness or social responsibility strategies implementation. The product receives achievement level in each category – Basic, Bronze, Silver, Gold or Platinum – with the lowest achievement level representing the product's overall mark. Every two years, manufactures must demonstrate good faith efforts to improve their product in order to have them re-certified.

III. IMPLEMENTATION OF CIRCULAR ECONOMY IN THE CZECH REPUBLIC

The importance of the circular economy to European industry was recently highlighted in the renewed EU industrial policy strategy. In January 2018 the Commission adopted a new set of measures in Circular Economy Package with Common EU targets by 2030: for recycling75% of packaging waste; for recycling 65% of municipal waste; a building landfill target to reduce landfill to maximum 10% of all waste; a ban on landing of separately collected waste. (European Commission, European Commission Press Release Data Base (2018).

Czech Republic is slowly embracing the CE approach. There are positive shifts in the field of environmental protection. We should mention the following Czech innovative companies that have received international recognition. More detail information everyone can find on the sites of presented companies, just putting their names.

KOMA Modular - is a Czech company that designs, manufactures and implement construction objects for any purpose (kindergartens and schools, office buildings, sports facilities, shops, restaurants, ambulance, small manufacturing plants, kindergartens and schools, office buildings, sports facilities, ambulance, small manufacturing plants, modular homes and others. Based on a quick-to-build modular construction system, the company produces ecological, special and low energy modules with very high - standard, innovative, beautiful and environment-friendly.

MIWA is a Czech company that has come up with a technological innovation that eliminates disposable packaging on the principle of so-called "precycling" from the whole process from the manufacturer, the seller to the customers. With the help of reusable capsules through Cartridge dispenser stand it delivers the goods from the manufacturer to the store, minimizing the use of disposable packaging, and offers the consumer a comfortable and hygienic purchase of the goods in a returnable, custom or organic package. Ordinary customers can buy the goods over the mobile and record a subscription for payment.

JRK Waste Management s.r.o. specializes in dealing with biological waste for large and individual customers. The aim of JRK Czech Republic is to dismantle a biodegradable component (i.e. garden waste such as grass, foliage shrubs and trees cuttings, as well as kitchen waste) from mixed municipal waste. It helps to: 1) reduce the amount of land field waste; 2) reduce the cost of waste collection = savings of municipal finances); 3) prevent the creation of huge amounts of greenhouse and other gases;4) transform the bio-waste into a valuable source of nutrients - compost. One of the meaningful project builds on a simple idea "For less waste". A smart waste evidence system called ECONIT, developed by JRK is implemented even in a small village. One of the hundreds of positive examples is Prostřední Bečva – a village that saved 334,000 CZK in 2017, reduced the amount of mixed municipal waste by 31% and introduced a motivational system for all its citizens.

There are three main non –governmental organizations, dealing with CE in Czechia.

The Union of Redistributors and Processors of

Secondary Raw Materials (SVDS), which on its website informs its members about the CE and documents issued by the EU on this subject. In line with the policy of EuRIC, the Czech Republic tries to draw attention to the category of secondary raw materials to promote the increase of recycling and recovery of waste.

The Circular Economics Institute – (INCIEN) - Non-governmental, non-profit organization was founded in 2015, focusing on environmental management, especially the circular economy. At present, the institute launched the pilot project "Circular Cafe," based on ten recommendations for circular behaviour: do not waste food; cook without food; shop without packaging, reuse coffee grounds; avoid disposable items, íe. dishes, plastic continuers, napkins, cup glass; save water, energy; clean ecologically; sort, recycle [2].

The Czech Association of Circular Economy (http://www.caobh.cz) was established in July 2016. It is a voluntary non-political union of citizens and corporations that promote saving of primary resources, reducing costs in industries and negative environmental and health impacts by reducing waste. Its main tasks are to formulate unified comments to the forthcoming legislation, support education and enforcement of circular economy principles through trainings, seminars, conferences.

To sum up, the implementation of CE is coming from "bottom-up approach", i.e. from the level of several business entities and non-governmental institutions, mentioned above. Moreover, if we go through the website of the Office of the Government or the Ministry of the Environment, the circulate economy have not been mentioned at all.

IV. A SURVEY ON AWARENESS OF THE CIRCULAR ECONOMY AMONG THE YOUNGER GENERATION

In order to test the level of knowledge, the mentality of Czechs about CE, their attitude to the environment, eco-innovation and eco-friendly development a brief study was conducted during the end of February 2019. The representatives of the generation born at the turn of the millennium (students) have been chosen as the respondents. This segment either enters or will enter into productive life in the next few years and will spend at least 40 years within the environment, what they can protect today, or they should learn how to protect and create it for tomorrow's future.

A short (about 10 questions) questioner was proposed. The total number of respondents was 137.

To the direct question of 1) "whether they have an awareness of the circulating economy?", - the overwhelming majority replied that they have not. To the task to «find the tree typical definitions CE or "give simply 3 typical words characterizing this term", - only three respondents answered closed to this topic! The attitude or practical behavior, responding to environmental protection was more favorable. Less than 60% of respondents admitted that they are "partly interested in this topic"; 40% answered "very often interested in this subject", three respondents admitting that they are dedicated to this topic in their research and practical work. To the question of "sorting the waste", 2/3 of the respondents sort the paper and plastic separately, 1/3 do sorting partially and episodically. Less favorable is the situation in sorting of rags and bio-waste. About 1/3 of respondents answered that they fully sort the rags and bio-waste; others have applied for partial sorting, either rags or bio-waste. To the question of sorting the battery and drainage of retired electrical appliances into electrical waste containers, about 50 % of the respondents answered that they make this sorting, while the other 50% only occasionally participate in this type of waste recycling. Positive opinions have brought respondents' replies to their opinion to the removal of plastic bags, what are offering without charge in retail chains, while goods purchasing. The overwhelming majority welcomes and likes paper bags. Nor do they despise and often welcome diversion from plastic trays, cups and cutlery. Respondents' attitude towards the energy costs of operation and the service of lifetime of purchased goods. The majority of respondents pay attention to lifetime, rather than to energy operating costs, choosing the answers "surely, yes" and "rather yes". The majority of respondents (79%) get the information about environmental protection from media (internet, television, print); 20 % - remember the subject from secondary school 1 % - from summer camps, etc.(see, Fig.1).

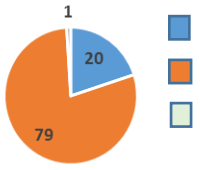

Figure1. Promoting environmental awareness

Source: authors' calculation

The results concerning the students recommendations for better using and evaluation of resources were the following: the first place was the enhancement of secondary and higher education; 5% of respondents proposed a change in tax system and implementation of environmental taxes. Surprisingly, about a quarter of respondents did not offer anything by selecting the answers: "I don't know," or "I don't deal with this topic."

V. SUMMARY

The underlying hypothesis of this paper was that both awareness of people and practical applications of CE new concept are low in the Czech Republic. We also assumed that getting a common understanding of the concept of CE is crucial for business, education and the whole community, as it is a prerequisite for a successful implementation in businesses. The content analysis of CE concept developing

allowed us to clarify the most prominent definition and concept of CE. We have found that between the different approaches the concept eco-effectiveness and, especially Cradle - to - Cradle Design concept is a positive agenda for the conception and production of goods and services that incorporate social, economic, and environmental benefit.

Our findings confirmed the hypothesis of a slow CE implementation in the Czech enterprises. While CE has become a part of the government programme in the Czech Republic, the activities of the Czech executive bodies and the first practical results are not very encouraging. We found that the shifts towards the CE in the Czech Republic are implemented so far with " bottom - up", approach i.e. from the level of several business entities and non-governmental institutions. The examples of good Czech practices confirmed that there are eco-innovative companies introducing the creative environmental, ecological and social responsible solutions, but these examples are still limited and they are not a subject of strong benchmarking and promotional campaigns.

The results of primary research indicate that the younger generation (particularly the group of "20-22 year-olds" students) have limited awareness and poor understanding about the CE approaches, programs and business practice. The vast majority of respondents do not know anything about the circulate economy. The surveyed group of respondents' admitted that they gained from media the majority of information, but it come to them fragmentary and uncompleted. Moreover, they do not associate this information with the term circular economy, rather waste management. Their ecological awareness and behaviour are limited to the separation of paper, fewer rags and bio- and electrode waste; their shopping preferences are more determined by economic aspects than by environmental aspects. The results of survey brought us to the conclusion that environmental education, including the circular economy, has failed in previous education (primary and secondary school). On the other hand, the positive shifts are recorded in the Czech Republic in the field of sorting and separation domestic (communal) waste.

Our recommendations relate to education and government's efforts to increase attention to CE implementation in the Czech Republic. Perhaps, many measures with a different time horizon will be very reasonable and actual today.

- Immediate: it is necessary to focus on education of CE in different levels, explaining theory and promoting good practice examples. Findings of this paper lead the authors to look for ways to inform the general public about CE and its usefulness with regard to environmental protection (popular articles in the press, presentations at conferences, etc.) to inform the general public about CE and its usefulness with regard to environmental protection. Certainly, the CE should be incorporated into lifelong learning courses.
- Consecutive horizon is to focus on preparation of designers who will be able to produce products according with relatively new concepts, inspired by nature (see, as an example Cradle to Cradle Design™) in which products are created according to the principles of an ideal circular economy. Increased efforts will be needed to implement the revised waste legislation and develop markets for secondary raw materials. It will be necessary to support the projection of EC-based logic into the tax area.
- Longer –time horizon. A significant effect can bring about changes in behavioral patterns (a CE-based culture of the whole society).

Research limitations come from the study's sample and the method of research. The topic concerning the elaboration of attitude toward the CE deals only with one type of generation (Y-millennial) generation. The examination and comparison of three generations (X, Y, and Z) and to test their attitude to CE awareness will be the topic of further research.

REFERENCES

[1] COM. Reflection paper towards a sustainable Europe by 2030. [M/OL]. 30 January 2019. https://ec.europa.eu/commission/sites/beta-political/files/rp_sustainable_europe_30-01_en_web.pdf

[2] Circular Economy Institute. Circular Czech Republic. [M/OL] 2018 https://incien.org/wp-content/uploads/2018/08/WP_CE.pdf

[3] Boulding, K. The economics of the coming spaceship earth //Environmental Quality in a Growing Economy: Essays from the Sixth RFF Forum. [M/OL]. John Hopkins University, 1966 http://arachnid.biosci.utexas.edu/courses/THOC/Readings/Boulding_SpaceshipEarth.pdf

[4] W. R. Stahel, The product life factor: An Inquiry into the Nature of Sustainable Societies [J]. The Role of the Private Sector (Series: 2, MitchellPrizePapers), NARC, 1982 *(*19): 51-59.

[5] Z. Yuan, J. Bi, Y. Moriguichi, The circular economy: a new development strategy in China [J], Ind. Ecol. 2008, 10 (2): 4 – 8.

[6] E. Erkman, Industrial ecology: an historical view [J] Clean. Produc. 1997, 5 (1): 1-10.

[7] R. Ayres, L. Ayres, Industrial Ecology: Towards Closing the Materials Cycle [M]. Edward Elgar Publishing, Cheltenham, UK, 1966.

[8] J. Kirchherr, D. Reike, M. Hekk, Conceptualizing the circular economy: An analysis of 114 definitions [J]. Elsevier, Recourses, Conservations and Recycling, 2017, 127(12):221-232

[9] W.Braungart, W. McDonough, A. Bollinger, 'Cradle-to-cradle design: Creating healthy emissions – a strategy for eco-effective product and system design' [J], Journal of Cleaner Production, 2006, 15 (13-14): 1337–1348.

[10] A. McDonough, W. Braungart, Recycling, industrial management, environmentalism [M], North Point Press 2002.

[11] J.M. Benyu, Innovation Inspired by Nature [M]. Paperback. Harper Perennial , 2002.

[12] G. Pauli, The Blue Economy:10 years – 100 innovations – 100 million jobs [M]. Pauli Paradigm Publication, 2010.

[13] Ellen MacArthur Foundation, Towards the Circular Economy: Economic & Business Rationale for an Accelerated Transition. [M/OL] https://www.ellenmacarthurfoundation.org/assets/downloads/

[14] European Commission Press Release Data Base. Circular Economy: New rules will make EU the global front-runner in waste management and recycling. 2018, September 14 [M/OL]. http://europa.eu/rapid/press-release_IP-18-3846_en.html