

## COSTS AND REVENUE OF COMPANIES IN CIRCULAR ECONOMY

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### **Abstract**

*The circular economy is a strategy of sustainable development that creates functional and healthy relationship between the environment and human society. The theory of sustainable development arises of conflict between population growth and economic growth on one side and limited natural resources on the other side. It is based on principles of long-term development with a focus on the needs of future generations and on preserving essential functions of the ecosystem. The circular economy describes an economic concept that aims to save resources by minimization of consumption of material and energy during the whole life cycle of products, including repair, reuse, and recycling. This paper aims to identify contributions of the model of circular economy from point of view of its utilization within conditions of the business companies, based on content analysis and own analytical research. The first part of the paper is dedicated to explaining the idea (concept) of circular economy as recognized by foreign authors, international organizations, etc. In the second part, this concept is applied to conditions of the business companies from the perspective of increase of production and consumption (increase of revenue), as well as from the perspective of decrease of production and consumption (decrease of costs) by the innovations.*

### **Key words:**

*circular economy, sustainable development, costs, revenues, firm, innovation*

**JEL Classification:** D23, D24, F61, P28, Q2

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### **Introduction**

The circular economy is a sustainable development strategy that creates functional and healthy relationships between nature and human society. Although environmental protection is nowadays a common requirement, in the modern sense the term began to be used only in the 1960s, and in the international context, interest in it only increased following the United Nations Conference on the Environment in 1972 (Moldan 2015).

The circular economy is the perfect closure of material flows in long-lasting cycles, opposing our current linear system, where raw materials are converted into products, sold and burned or landfilled at the end of their life. The circular economy and its basic principles are based on the idea that all product and material flows can be reconnected to their cycle after they have been used, where they will again become sources of new products and services. This means that waste as such will no longer exist. While replacing primary materials with secondary materials can offer part of the solution, recycling is not a final, but also

attractive, solution because its processes are energy intensive and generally mean degradation of materials - all of which leads to an increase in demand for original materials. The circular economy goes beyond recycling because it is based on a restoring industrial system leading to the disappearance of waste. Recycling can be conceived as the outer packaging of the whole circular economy, requiring greater energy consumption as the inner packaging of the circular economy, which means in particular repair / treatment, reuse or treatment (Inštitút cirkulárnej ekonomiky 2019). Therefore, the aim is not only to improve the life cycle and use of the product itself, but also to minimize energy consumption.

The idea of material circulation is not new, but it is currently receiving attention and respect. It was first presented in 1966 by economist Kenneth Boulding. In his work, he calls the closed economy of the future a cosmonaut economy in which a country becomes a spacecraft without limited supplies of all resources, whether for pollution or resource use, and in which one has to find its place in a cyclical ecological system capable of continuous

reproduction (Boulding 1966). Since then, a number of concepts have emerged that seek to change the processes in the economy to work more sustainably. These include the circular economy, which is presented in contrast to the long-term dominant linear movement of material by the economy - the source is obtained and processed by the product, which becomes the subject of consumption and at the end it is waste. This arrangement in the last century supported, among other things, the downward trend in real prices of raw materials, but today it is reaching limits. These include world population growth and the growing middle class, volatility of the raw materials market, depletion of natural resources and negative environmental impacts (Ellen MacArthur Foundation 2017).

#### Literature overview

Jay Gronlund (2015) also defines the circular economy on the basis of the Circle Economy, a member organization in the Netherlands, at six points, in addition to requiring that materials used in production circulate endlessly and energy used for production comes from renewable or sustainable sources. It is then the interest of maintaining ecosystem, value, human health and society. Specifically, promoting the ecosystem and rebuilding natural capital, generating value, promoting human health and a cohesive society and culture (Gronlund 2015).

The circular economy is also a very important concept supported by the EU, several national governments and many businesses around the world. According to Korhonen, Honkasalo, Seppala (2018), however, the scientific and research content of the circular economy concept is superficial and disorganized. According to them, it appears as a collection of vague and separate ideas from several disciplines and scientific concepts. The obligation to draw up waste prevention programs is laid down in Directive 2008/98 / EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives (hereinafter referred to as the "Waste Framework Directive"). The main aim of the measures taken in waste prevention programs is to break the link between economic growth and the environmental impacts of waste generation. In the current EU Environment Action Program, the circular

economy is part of a vision by 2050. Specific measures were then introduced by the European Commission in the so-called Circular Economy Package as early as 2014. However, with the new Commission, the original proposal was withdrawn in the following year new. In both versions, the package consists of a Communication presenting the Commission's strategy in this area and a proposal to amend 6 waste management directives (European Commission 2015).

Through the European Structural and Investment Funds, the European Union supports many projects in member countries aimed at transitioning and promoting the circular economy (circular economy). One example is the Interreg - Slovak Republic - Hungary Cross-Border Cooperation Program and the "Circular Economy" project, which was implemented by April 2019 and financed by the European Regional Development Fund. The project "Circle of Circular Economy" was intended to bring these principles to schools, to acquaint them with the coming generations and to show them how practical solutions work in everyday life. The aim was to show this systemic change to pupils not only in theoretical form, but to introduce as many principles of circulation economy as possible into practice and everyday life of school, its pupils and teachers. A major and visible step will be to reduce mixed municipal waste (ZKO) by introducing separate collection and composting at school. The project also involves cooperation of students from the Czech Republic and Hungary. The result is so-called 'Circular Schools'. The project will involve at least 40 secondary (or primary) schools. Of which 20 in Slovakia (Bratislava, Trnava, Ústí nad Labem Region) and 20 in Hungary. Educational activities include lectures, workshops or seminars on the following topics: Waste management - Waste resources, Biodegradable waste management - Composting, Renewable energy, Water management, Transport, Clothing industry, Green buildings - Sustainable buildings.

Another interesting project that was implemented in 2019 is the project "Office without a basket". The aim of the project was to reduce the negative impact on the environment through proper sorting and prevention of waste at work. In the office, many of us spend up to a third of our lives, so it is important that we

reflect on the consequences of our day-to-day operations in this environment. The project was therefore focused mainly on waste from office space. The ideal is not to create any waste in the office and therefore to have no baskets (Inštitút cirkulárnej ekonomiky 2019).

In the Czech Republic, the development can be observed in the desired direction, but overall it has achieved below-average results in the area of resource and waste management within the EU and it is expected to solve many challenges. The circular economy is not one of the government's priorities now, and the related strategic documents do not clearly show the interconnection of the whole cycle. There is also problematic persistent double reporting of waste data, which, among other things, makes it difficult to evaluate the fulfilment of targets. Moreover, the question is whether the sectoral approach to the circular economy will be sufficient in the future and what degree and form of coordination may be appropriate, given the current weakening of the position of the Sustainable Development Council.

According to Cyril Klepek (2018), there are four areas of barriers to the implementation of circular economy principles: cultural, market, technological, and regulatory. Cultural barriers are seen by consumers and businesses, however, according to CSR & Reputation Research 2016, 68% of people in the Czech Republic are willing to pay extra for an environmentally friendly product. Market barriers are high costs, and companies also fear limited competitiveness

when switching to another business model. The biggest market obstacle is to obtain secondary raw materials from recycled sources that are comparable in price to primary raw materials. This is also related to the complex search for partners to make changes in the supply chain. Klepek currently sees an opportunity to be the first in the market and gain long-term contracts and a position in the secondary resources market, which will be hard to catch up with. Another barrier is the poor availability of new technologies and their already mentioned high acquisition costs.

According to Ritzen and Sandstrom (2017), this concept offers companies a lot of room for innovation or material savings, while at the same time representing a step into the unknown. Business processes are now optimized in the context of the economy linear and their change would often require considerable investment. The lack of public awareness and the lack of skilled workers are also an obstacle.

According to the latest EEA (European Environment Agency) report, European companies are increasingly adopting circulation business models, which are mainly focused on operational efficiency and waste reduction. Another promising development is the transition from product-based business models to service-based models. Corporate culture, market factors and the complexity of the system seem to be the biggest obstacles to making greater use of such models.

*Picture 1. Process of circular economy*



Source: *Inštitút cirkulárnej ekonomiky 2019*

### **1. Ideology of circular economy in terms of increasing production and consumption**

According to many authors, the circular economy in the harsh conditions of the prevailing system is not used for the benefit of the environment but for the fundamental imperative of most market players, which is profit. According to them, the ideology of the circular economy can lead to increased and not reduced consumption as the planet would need (Profant 2019). The fact that buying green products helps the planet can induce us to shop and consume more. So the question arises as to whether it really is a new economic model, as it is presented by most authors, or just another unsustainable ideology disguised in a new coat. In essence, it is about reusing things instead of throwing them away and making new ones at multiple levels. At the level of finished products, it may be a move to the second hand market or minor repairs. At a lower level, it is still a matter of using the whole thing, but with replacing parts of the product, such as replacing the battery in the case of a phone. And at the lowest level, this is recycling, i.e. the reuse of materials used in production, such as metals in the case of a telephone. At first glance, the circular economy thus appears to be a meaningful, directly necessary approach to production and

consumption. If mineral resources circulate in our economy, instead of being dumped, our lives will finally be in line with the principles of sustainable development.

In author's opinion, the main problem of the circular economy is the very economic context in which the circular economy is to function. The circular model is to ensure the competitiveness of landscapes, their stable economic growth and a healthy environment. At the same time, however, the circular economy should become part of the functioning of a society based on investment, competition and economic growth. The allegedly new model, or even the system, is neither new nor a fundamental change. Recycling took place long before capitalism began, but more importantly, the fundamental principles of the capitalist economy remain intact. And it is these who jeopardize the meaningfulness of establishing a circular economy. First of all, it is the consumer behavior of market participants. The main goal of many companies is to sell as many of their products as possible, regardless of whether their consumers need them. Advertising serves not only to inform shoppers, but also to convince you that a new product is essential for life and needs to be bought, although the older still serve quite well. Here comes the problem of green consciousness of consumers. Somewhere in the

subconscious, we realize that maybe it is not quite right if we throw something that works, whether we buy something that we do not need. The ideology of the circular economy is becoming an ideal helper here, directly saving the economic system based on maximum use of resources, private property and free market.

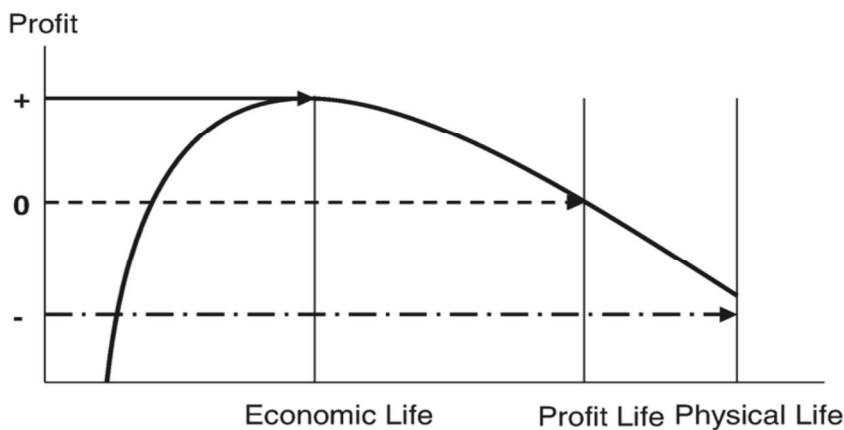
The desire for and enjoyment of consumption remains undisturbed as non-recyclable goods become a green eco-product. Indeed, the desire to shop is even greater. Experimental research conducted by EMF 2013 shows that people in the toilet use more paper towels when using recycling bins. The feeling of helping the planet by buying green products can encourage us to shop and consume more. Waste is no longer an environmental problem, but becomes a resource that we help to create through our consumption behavior. Simply put, the ideology of the circular economy can lead to increased and not reduced consumption.

According to scientists from the University of California and Loyola Marymount University, any savings that the circulation of material will provide does not mean the same savings for the planet. Conversely, seemingly ecological savings can lead to even greater consumption of the materials due to the lower

cost. For example, used or repaired phones will not replace new ones, but will only expand the existing market to include a second-hand phone market that will be sold to consumers in poorer countries. So the total consumption of phones will not decrease, but will increase. Another typical case of growth in consumption within the circular economy may be, for example, virtualization of the economy. For example, online video on demand reduces the demand for physical video delivery, but overall video consumption increases.

As for the value of the product (equipment), it decreases during its long-term ownership. The causes of impairment are mainly the deteriorating appearance and wear of the components. To adjust to the situation, we are correcting. Especially for large construction machines, repair costs are small compared to machine costs. Life Cycle Cost Analysis (LCCA) provides us with useful information about the profitability of a business in long-term ownership of machines. There are three ways of life: physical life, profitable life and economic life. Picture 2 shows that the owner can decide on the life of the device with respect to the expected profit.

Picture 2. Life cycle cost analysis (LCCA)



Source: Douglas 1975

It is important to consider whether, in the current economic system, the circular economy is truly a new sustainable economic model. It keeps us in the idea that we can live as

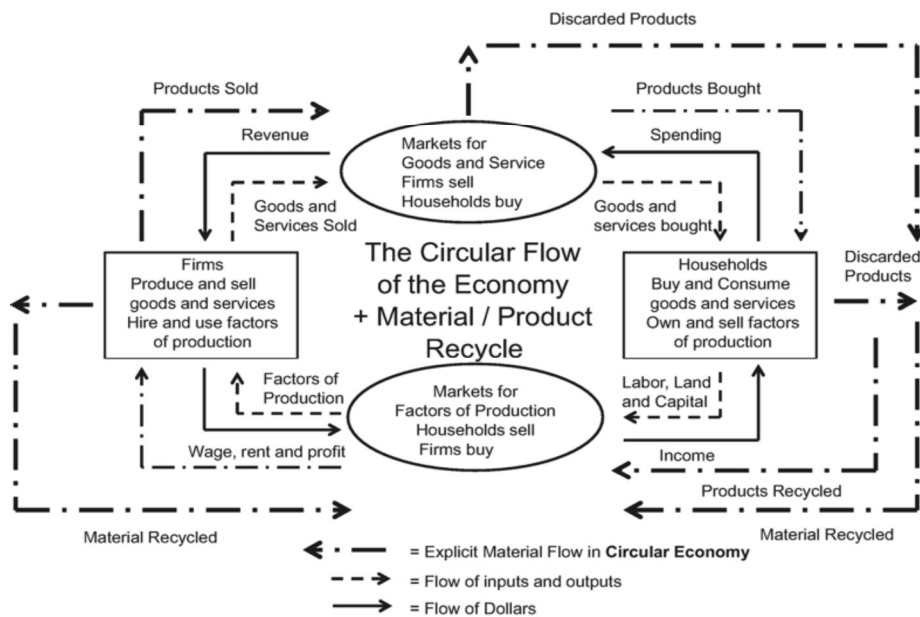
we do now and grow economically, while preserving nature, which in my opinion is difficult in the current consumer behavior.

**2. Why it pays to companies introduce circular economy innovations (CE)?**

From the theoretical point of view, there are various transmission channels ranging from CE innovations to higher business performance. First, CE innovation, such as reducing energy and material consumption, replacing fossil energy from renewable sources, or recycling waste, water or materials can lead to cost savings at least in the long term. These cost savings allow the company to reduce product prices, leading to increased demand for the company's products. However, in the short term the introduction of CE innovation can lead to additional costs due to the cost of additional equipment or organizational changes. Secondly, taking into account the Porter hypothesis (Porter, van der Linde 1995), new CE-serving products (such as energy-saving products or products characterized by higher recyclability or longer

lifetime) may lead to first-move benefits that are also accompanied by higher competitiveness of innovative firms. Thirdly, this process can be re-applied if consumers are willing to pay more for the added ecological value of products, which also has a positive impact on product demand. This argument is also discussed in the Corporate Social Responsibility (CSR) literature (e.g. Ambec, Lanoie 2008, and Hart 1997). "This literature combines the positive returns of greener production opportunities to improve company ranking in the market, access new markets or reduce costs due to increased resource efficiency" (Ghisetti 2018). Especially in regions characterized by high awareness of environmental issues, CE innovation can also enhance the company's reputation, which will also lead to a positive demand effect (Horbach, Rammer 2018).

*Picture 3. Material (product) flow in Circular model of economy*



Source: Hayashi H. 2004

Although there are arguments for the positive effects of turnover on CE innovation, their effects on employment remain theoretically undetermined, especially since the effects on employment may vary according to the type of

CE innovation. Innovation of the CE process (e.g. Energy or material savings in the production process) and innovation of CE products (e.g. higher product recyclability or longer product life) are likely to lead to very

different employment impacts. Process-oriented CE innovations could have negative effects, as implementing these innovations can lead to higher labor productivity. Productivity can increase because CE process innovation often requires reworking the entire production process from material selection to final product design. Such modernization could also lead to the replacement of labor by capital (e.g. increased use of robots) and thus increase labor productivity.

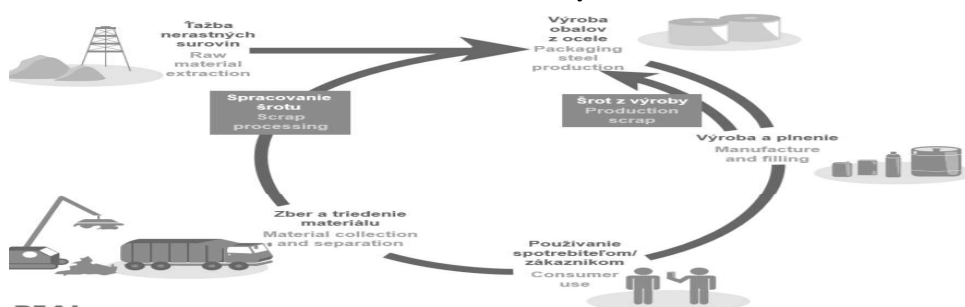
However, increased capital efficiency can lead to higher valuations of capital over labor and thus generate lower wages, which in turn can mitigate the negative effects on employment replacement by capital (Douglas DG, O'Connor EP. 2016).

Implementing CE innovation can be a positive direct effect on employment, where such innovation is available through additional investment or more specialized and successful employees. Completely new CE-related products that generate new demand for a company that produces a positive effect on employment but favors employment will only show disadvantages where the new product does not replace the old product of a more labor-intensive business. Sellers of medicinal products can negatively affect employment due to low

demand for products that want to offset higher consumer demand for these products (Harrison 2014).

For example, U. S. Steel Košice, one of the largest integrated producers of rolled producers in Central Europe, embarked on an investment program to improve its technologies that affect the environment, performance and process quality. The steel life cycle is a direct example of a permanent material and a closed material cycle on which the concept of circular economy is based. In principle, this can be attributed to the basic properties of steel, namely its endless recyclability without loss of quality in combination with magnetic properties, making it easily separable from other waste materials. The approach of steelmakers to the recovery of by-products of their production is also important. Effective processing of primary raw materials and their return to the recycling cycle for dust, sludge, debris, scale and oil labeled potential issues on the ground. Convenient possibilities of utilization of other products in furniture production is processing of blast furnace and steel slag in conditions of USSK Company (Ministerstvo životného prostredia Slovenskej republiky, Slovenská agentúra životného prostredia 2019).

**Picture 4. Process of processing secondary raw material from primary production in metallurgical industry.**



Source: Ministerstvo životného prostredia Slovenskej republiky, Slovenská agentúra životného prostredia, 2019

The annual volume of blast furnace slag processed in USSK reaches an average of 1.2 million tons. About 70% of its annual volume is processed by granulation by rapid cooling of the slag melt with industrial water. It is subsequently used in the cement industry. The remaining part consists of air-cooled blast furnace slag, i.e. artificial aggregate, which has a wide application. It is used in construction of road infrastructure, production of cement, concrete mixtures and various building materials, landscaping and backfilling, winter maintenance of roads and sidewalks. Slag thus provides an alternative to natural rocks such as limestone, andesite, dolomite or granodiorite. Its use removes negative environmental impacts associated with mining of natural aggregates. In the past, this aggregate has helped local and municipal authorities to protect the environment and reduce their significant financial costs associated with the use of natural aggregates. Specifically, in 2012 - 2016, USSK provided 369,768 tons of aggregate to the boroughs of Košice and the municipalities of the Košice and Prešov Self-Governing Regions. Last but not least, the gases produced as an inevitable consequence of blast furnace processes, steel converters and coke oven batteries have been used for years as a secondary energy source and thus substitute for heat and electricity production from fossil fuels. In this way, USSK produces 50% - 62% of its annual electricity consumption (Ministerstvo životného prostredia Slovenskej republiky, Slovenská agentúra životného prostredia 2019).

### Conclusion

If a business wants to be a market leader, it must make the best use of its resources, which means that it recycles and reuses them instead of burying them in landfills. More efficient, faster and re-use of resources will increase the competitiveness of individual companies. In the circular economy, the value of products and materials is maintained for as long as possible, since waste production and resource use are kept to a minimum and resources are maintained in the economy once the product reaches the end of its life Cycle and are reused to create added value. This model could create safe jobs in Europe, foster innovation that provides a competitive advantage. In addition, it can provide a level of protection for people and the

environment that Europe can be proud of. This model can also provide consumers with more durable and innovative products that deliver financial savings and improve quality of life. On the other hand, it is necessary to perceive this economic model also in connection with consumption behavior of individual market actors and with increasing consumption. The fact that buying green products helps the planet can encourage us to shop and consume more, as many international researches have shown.

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