ECONOMICS OF SUSTAINABLE DEVELOPMENT
Vol. 4, january-june 2020, № 2
UDK 33+502/504
ISSN 2560-421X

Milan Marković[1]
University of Niš, Innovation Center

Bojan Krstić[2]
Tamara Rađenović[3]
University of Niš, Faculty of Economics

P. 1-9
ORIGINAL SCIENTIFIC ARTICLE
doi: 10.5937/ESD2001001M
Received: January, 01. 2020.
Accepted: March, 03. 2020.

CIRCULAR ECONOMY AND SUSTAINABLE DEVELOPMENT[4]

Abstract

The waste increase and the environmental damage risk are important causes for the emergence of a new economic model that replaces the linear economy. The aim of the research is to point out the importance of the circular economy in a globalized society in which the sustainable development is a highly positioned goal. The importance of the issue stems from the fact that social welfare, apart from the development of production, must also be based on the preservation of health and living environment. The paper demonstrates many economic and social benefits from the implementation of the circular economy principles, as well as, the basic elements of this concept. The main objective is to reduce waste from the existing production cycle through the recycling process.

Key words: *circular economy, linear economy, sustainable development, environmental protection, waste, recycling.*

JEL classification: *Q01, Q56, Q57.*

ЦИРКУЛАРНА ЕКОНОМИЈА И ОДРЖИВИ РАЗВОЈ

Апстракт

Повећање отпада и ризика од нарушавања животне средине јесу битни узрочници настанка новог економског модела који замењује линеарну економију. Циљ истраживања јесте указивање на значај циркуларне економије у глобализованом друштву у коме одрживи развој представља високопозициониран циљ. Важност теме произилази из чињенице да се друштвено благостање, осим развоја производње, мора заснивати и на очувању здравља и животне околине. Рад показује многе економске и друштвене користи од спровођења начела циркуларне економије, као и основне елементе овог концепта. Основни циљ је смањити отпад из постојећег циклуса производње кроз процес рециклирања.

Кључне речи*: циркуларна економија, линеарна економија, одрживи развој, заштита животне средине, отпад, рециклирање.*

[1] markovicmilan89@gmail.com, ORCID ID 0000-0002-9617-6697

[2] bojan.krstic@eknfak.ni.ac.rs, ORCID ID 0000-0003-4597-6819

[3] tamara.radjenovic@eknfak.ni.ac.rs, ORCID ID 0000-0003-1632-7772

[4] The paper is a part of the research financed by the Ministry of Education, Science and Technological Development of the Republic of Serbia

Introduction

The unsustainable use of natural resources, combined with the continuous waste increase, has risen concerns about the survival of the humanity, and the appropriateness of the existing model of linear economy (Stipić, 2017). Industrial development (with growing waste, especially in big cities) and climate change are the key factors that have led to the expansion of a sustainable development paradigm, and the concept of a circular economy within it. Especially, environmental factors (such as, agriculture and transport (Sagić, 2016)) support the sustainable implementation of a circular economy (Busu & Trica, 2019).

Sustainable development paradigm involves incorporation of the three dimensions: economic, environmental and social, in all community domains (Rađenović & Krstić, 2020). Namely, it involves the commitment of an enterprise to perform its operations and activities in a way to be accountable to all its stakeholders. Consequently, the concept of circular economy emerged as a combined effort of different school of thought (Hernandez, 2019). "The notion of circular economy means a model that changes the paradigm so far and enables resource management in an efficient way, based on eco-innovation, eco-design and the use of renewable energy" (Stipić, 2017, p. 723). That is why this concept enables the planned and sustainable use of resources.

The circular economy paradigm is as an extension of the sustainable development paradigm, and hence it entails many economic, social and environmental benefits (Prokić, 2019). Namely, it is based on the principles of sustainable development, and it is created to replace an unsustainable linear economy model in all prospects. The circular economy is present in all segments of economic activity, but it is especially worth noting its application in the field of agriculture and industry. The need to increase agricultural production is being highlighted by ensuring the food security for the growing population, so the concept of a circular economy must ensure that the stated objective is achieved, without disrupting the environmental objective. That is why a sustainable agricultural production strategy is essential, and will allow better resources utilization and waste reduction (Zečević et al., 2019).

Bearing all this in mind, the aim of this paper is to stress the importance of circular economy in the globalized environment, and emphasize its benefits for the society. Hence, besides the introduction, the paper is divided into 3 segments. The first section discusses the link between circular economy and sustainable development and highlights the basic similarities and differences between these concepts. The second part deals with the theoretical consideration of the evolution of the circular economy concept, as well as, the importance of innovation given the subject of the study. Finally, the concluding considerations and recommendations are given based on the theoretical research.

1. The relationship between circular economy and sustainable development

The key elements of the strategic commitment of almost all modern countries are building the innovative potential of the economy and implementing the principles of sustainable development. With the process of globalization and integration of the world economy, the need for sustainable development has been increasingly emphasized, so this goal is high on the agenda of many governments. Especially, the environmental sustainability has gained the attention. "Environmental sustainability typically refers

to issues associated with challenges ranging from climate change to biodiversity loss to pollution" (Kopnina, 2017, p. 28). In this regard, various documents are being created with the aim to put into practice some of the environmental solutions. Thus, there are many documents in the EU that enable the implementation of the "Sustainable Development Strategy" (Andrijašević et al., 2019):

Strategy for EU environmental policies integration (energy, sustainable agriculture, internal market, fisheries policy, economic policy, transport, foreign policy, coastal zone development and management, urban environment, etc.) (https://ec.europa.eu/environment/integration/integration.htm),

"Strategy on the sustainable use of natural resources" (https://ec.europa.eu/environment/archives/natres/index.htm),

Strategy for waste prevention and recycling.

Sustainable development has emerged as a need to align the goals of technological progress and economic growth and development, with the goal of preserving the quality of the living environment. It recognizes that economic growth must not be viewed in isolation in the realization of overall socioeconomic development. Namely, the uncontrolled production can lead to the enormous environmental degradation, such as to question the future development and survival of life on the planet. The goal of the sustainable development concept is to preserve and maintain the current well-being. Accordingly, sustainable development is based on the principles of maintaining the living capacity of at least the same quality for generations to come.

Unlike sustainable development, the circular economy is a relatively new concept. Although theoretical considerations were present in the last century, the practical application of concrete solutions has been increasingly discussed nowadays. Hence, the circular economy is becoming the subject matter of many experts and scholars in the fields of economics, environmental protection and biotechnology. The circular economy paradigm is based on a production model which supports the sustainable economic development without damaging the environment (Krysovatyy et al., 2018a). This is the reason for underlining its greatest connection with the concept of sustainable development, since it promotes the responsible use of material and other resources.

Although the concept of sustainable development is considerably wider than the concept of circular economy, it is necessary to point out the key similarities between them (Geissdoerfer et al., 2017, p. 772):

- Intra and intergenerational commitments,
- More agency for the multiple and coexisting pathways of development,
- Global models,
- Integrating non-economic aspects into development,
- System change/design and innovation at the core,
- Multi-/interdisciplinary research field,
- Potential cost, risk, diversification, value co-creation opportunities,
- Cooperation of different stakeholders necessary,
- Regulation and incentives as core implementation tools,
- Vital role of private business in the sense of resources and capabilities,
- Innovation business model,
- Technological solutions often pose implementation problems.

Generally, these are global development models which encompass the non-economic (environmental) goals in order to achieve the overall socioeconomic development. Moreover, both models are based on innovation, and due to the multidisciplinary issues they require the involvement of various stakeholders, including policy makers.

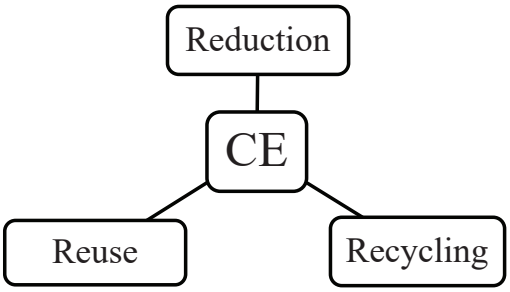
Contrarily, the basic differences between sustainability and circular economy given certain criteria (origins, goals, main occupation, system prioritisations, type of institutionalization, beneficiaries, timeframe of changes, and perceptions of responsibilities) are (Geissdoerfer et al., 2017):

- Circular economy is a newer concept,
- The concept of sustainable development has many more goals,
- As the circular economy is a narrower concept, it is mainly motivated by resource efficiency, waste reduction and harmful emissions,
- The primary objective of the circular economy is the realization of environmental benefits, which does not directly imply social benefits,
- Circular economy emphasizes economic and environmental benefits compared to linear economy, while sustainability provides a broader framework,
- Governments and companies are the dominant agents of the circular economy,
- The time dimension of sustainability is open,
- Responsibilities for the transition to a linear economy are shared between businesses, regulatory agencies and policy makers, while sustainability does not have clearly defined responsibilities of entities.

The basic principles of circular economy can be described by the abbreviation "3R" (*R*eduction, *R*euse and *R*ecycling of materials and energy)(Figure 1), and these are often cited as the three possible approaches in practice (Feng, 2004; Yuan et al, 2006).

These principles are based on the fact that waste is recycled and returned to the production process. Recycling means the re-use of resources that result from a production cycle, while reducing the use of new inputs in a re-production cycle within a circular economy.

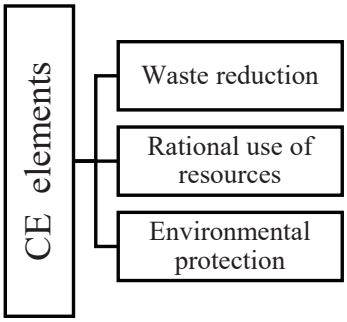
Figure 1: The principles of circular economy (CE)



Source: Authors' presentation based on Feng (2004) and Yuan et al. (2006)

The key principles of circular economy are based on the elements presented in Figure 2. The products based on these elements are intended to protect the ecosystem as well as to ensure their sustainable use through the recycling process. An alternative to waste reduction is to increase the possibility of reusing waste as input to new production, while the element of rational and efficient use of resources is primarily related to non-renewable resources.

Figure 2: Circular economy concept elements



Source: Authors' presentation.

In order to sustain the quality of living environment and prevent its further damaging, it is necessary to achieve ecological optimization of existing production processes, plants and waste streams, as well as, the future production development (Sagić, 2016). In addition, it is imperative that scientific, professional, R&D and innovation organizations offer technological solutions that are consistent with environmental efforts. Moreover, the goal is to achieve the economic growth without substantial increase of the new resources needed.

Since, almost all production processes are coupled with waste generation (Sagić, 2016), recycling is the key element of the circular economy. Hence, it is necessary to develop technological processes that will correspond to the goals of circular economy and sustainable development. The ability to recycle materials is the key to sustainability, while the other essential element is the use of cleaner technological solutions, which is significantly linked to the so-called industrial ecology. The industrial ecology points toward the beneficial effects of circular economy to the society and whole economy (Anderson, 2007). Production processes should be based on biofuels (bio diesel and bio gas) instead of oil. Additionally, the reuse of products generated in the previous production processes would allow water savings and energy preservation from non-renewable sources. Eventually, this significantly reduces the need for non-renewable and exhaustible energy sources.

The narrower interpretation of the circular economy concept is primarily related to the environmental effects. However, the recycling industry, for example, can create jobs, a plethora of innovations and an entire industry that provides even higher economic growth for the country, but also competition and profit for businesses. There are many other economic effects as well, since the implementation of circular economy goals also leads to efficient use or use of scarce resources and maximizing the value of the product/service (Radivojević, 2018, p. 35). Krysovatyy et al. (2018a) point out that the circular economy must provide economic benefits in the form of jobs and increased incomes, but also health, environmental quality and a secure future. Thus, the application of the circular economy concept has many social benefits associated with the well-being and the survival of humanity.

2. Development of the circular economy concept

Linear economy, a dominant concept in the past, involves only economically efficient (rational) use of resources and often leads to the accumulation of (as a rule non-recyclable) waste. The basic principle of this concept of economics is based on a matrix: *take–use–throw*, and production proceeds only in one direction. Such use of resources and disposal of waste causes degradation of the environment, as well as an increased needs for food, material and energy. This economic model is highly inefficient and unsustainable in the long run, since consumables are limited and population is growing.

On the other hand, the basis of the circular economy concept is the most efficient utilization (i.e. minimization) of waste, so that in addition to rational use of resources, the focus is on saving input elements of production (raw materials, materials), as well as the recycling process. Circular economy is, by definition, regenerative, based on the *production–consumption–reuse* model (Busu, 2017). Basically, the circular economy model is a completely different model which put emphasis on the resource efficiency, implement new approaches to production and consumption, and highlight waste conversion into resources (Avdiushchenko & Zając, 2019).

Between linear and circular economy is a concept based on the economy of resource reuse in the manufacturing process, without using these recycled products as raw material, which results in less waste than linear, but more waste than the application of the circular economy concept. On this basis, it is concluded that production within the circular economy must be able to take over products (which are often thought to have ended their useful lives) and put them into reuse, thereby obtaining a new purpose (Turner et al., 2019).

"A circular economy describes an economic system that is based on business models which replace the 'end-of-life' concept with reducing, alternatively reusing, recycling and recovering materials in production/distribution and consumption processes, thus operating at the micro level (products, companies, consumers), meso level (eco-industrial parks) and macro level (city, region, nation and beyond), with the aim to accomplish sustainable development, which implies creating environmental quality, economic prosperity and social equity, to the benefit of current and future generations" (Kirchherr et al., 2017).

At the micro level, circular economy is often viewed as part of the concept of corporate social responsibility (Berber et al., 2019). The goals of this model can be achieved "through long-lasting design, maintenance, repair, reuse, remanufacturing, refurbishing, and recycling" (Geissdoerfer et al., 2017, p. 763). In addition to the reuse of materials, the circular economy also involves the creation of added value through services and intelligent solutions (Krysovatyy et al., 2018b).

Apart from the circular economy, innovations, closely linked to this concept, can also contribute to sustainable development. Moreover, innovations of different types are a key driving force behind the concept of circular economy. These are innovations of products, processes, while the most striking innovations are in the field of information and communication technologies. "Until decades ago, the concept of a circular economy would not be applicable due to the fact that technology could not support its ideas" (Radivojević, 2018, p. 38). Therefore, the circular economy requires greater investment in R&D.

Innovation must meet two basic socioeconomic goals:

- Improvement of the living standards of the population, and
- Addressing environmental pollution.

Innovations that promote recycling, waste reduction and material use must be the focus as part of safeguarding the principles of circular economy and sustainable development (Cainelli et al., 2020). Some of the goals of innovation related to the circular economy may be the introduction of regenerative circular systems, as well as, reducing the dependence of economic growth on increased use of non-renewable materials and environmental degradation (Brown et al., 2019).

Firms have a significant role in these processes. In order to meet the circular economy goals, firms are adapting their processes and products, and these often require new or significantly improved production methods or new or substantially redesigned products (Horbach & Rammer, 2019). Such innovations can lead to the improved competitiveness of the innovating firms. Additionally, the consumers may be willing to pay extra money for the added ecological value of the products enhanced following the circular economy principles.

Conclusion

Like the circular economy concept, the sustainable development concept is a widely studied issue among theorists and practitioners. The danger of significant environmental damage is the basic motive for the emergence of both concepts. The implementation of the principles of circular economy and sustainable development should result in the maintenance of environmental quality, as well as, in the stable economic growth, which is based on preservation of non-renewable resources.

Circular economy is a new economic model that radically changes the current paradigm of linear economy. It represents a narrower concept than the concept of sustainable development. As there exists a growing interest of the academic community and the scientific and professional public regarding this issue, the aim of the research was to look at the theoretical aspects of the concept of circular economy and sustainable development, their connection and basic determinants.

A narrower interpretation of the circular economy boils down to an increased opportunity for resource reuse. In addition to recycling and energy efficiency, this concept also enables the application of some advanced technologies and innovations. However, the sustainable (economic) development is a much broader concept, because it also has a positive impact on slowing down the negative effects of climate change. Nonetheless, the circular economy is still in its early stages of development. It focuses mainly on the recycling and not on reusing (Mas-Tur et al., 2019). For this reason, in the Sustainable Development Strategy, this concept must take a special place, and the action plan should be based on the reuse of raw materials in the next production cycles.

But then again, the prerequisite for the implementation of the circular economy model is the change in the mentality of firms and consumers. As regards firms, they need to adjust product and process design to take into account the circular economy principles, by using waste as raw materials and reducing non-reusable products. The circular economy model proposes the usage of environmentally friendly materials in the production processes of products, which will reduce the environmental damage once their useful lives are over.

References

Andersen, M. S. (2007). An introductory note on the environmental economics of the circular economy. *Sustainability Science*, 2(1), 133-140. https://doi.org/10.1007/s11625-006-0013-6

Andrijašević, M., Tomić-Pašić, V., Pavlović, R. (2019). Računovodstveni aspekt cirkularne ekonomije kao faktor održivog razvoja (The accounting aspect of circular economy as a factor of economic development). In: Kostić, D. & Sttatev Vaslev, S. (Eds). *Međunarodna naučno-stručna konferencija - Regionalni razvoj i prekogranična saradnja (International Scientific Conference - Regional development and crossborder cooperation)*. Pirot: UO Privredna komora Pirot. (pp. 373-380)

Avdiushchenko, A., & Zając, P. (2019). Circular Economy Indicators as a Supporting Tool for European Regional Development Policies. *Sustainability*, 11(11), 3025. https://doi.org/10.3390/su11113025

Berber, N., Slavić, A., & Aleksić, M. (2019). The relationship between corporate social responsibility and corporate governance. *Ekonomika*, 65(3), 1-12. https://doi.org/10.5937/ekonomika1903001B

Brown, P., Bocken, N., & Balkenende, R. (2019). Why Do Companies Pursue Collaborative Circular Oriented Innovation?. *Sustainability*, 11(3), 635. https://doi.org/10.3390/su11030635

Busu, M. (2019). Adopting Circular Economy at the European Union Level and Its Impact on Economic Growth. *Social Sciences*, 8(5), 159. https://doi.org/10.3390/socsci8050159

Busu, M., & Trica, C. L. (2019). Sustainability of Circular Economy Indicators and Their Impact on Economic Growth of the European Union. *Sustainability*, 11(19), 5481. https://doi.org/10.3390/su11195481

Cainelli, G., D'Amato, A., & Mazzanti, M. (2020). Resource efficient eco-innovations for a circular economy: Evidence from EU firms. *Research Policy*, 49(1), 103827. https://doi.org/10.1016/j.respol.2019.103827

Feng, Z. (2004). *Circular economy overview* (in Chinese). Beijing, China: People's Publishing House.

Geissdoerfer, M., Savaget, P., Bocken, N.M.P. & Hultink, E.J. (2017). The circular economy - a new sustainability paradigm?, *Journal of cleaner production*, 143, pp. 757-768. http://doi.org/10.1016/j.jclepro.2016.12.048

Hernandez, R. J. (2019). Sustainable Product-Service Systems and Circular Economies. *Sustainability*, 11(19), 5383. https://doi.org/10.3390/su11195383

Horbach, J, Rammer, C. (2019). Circular economy innovations, growth and employment at the firm level: Empirical evidence from Germany. *Journal of Industrial Ecology,* 1-11. https://doi.org/10.1111/jiec.12977

Kirchherr, J., Reike, D., & Hekkert, M. (2017). Conceptualizing the circular economy: An analysis of 114 definitions. *Resources, conservation and recycling*, 127, 221-232. https://doi.org/10.1016/j.resconrec.2017.09.005

Kopnina, H. (2017). Sustainability: New strategic thinking for business. *Environment, Development and Sustainability*, 19(1), 27-43. https://doi.org/10.1007/s10668-015-9723-1

Krysovatyy, A., Zvarych, R., Mokiy, A., & Zvarych, I. (2018a). Alterglobalization via the inclusive circular economy paradigm. *Economic Annals-XXI*, 174.

Krysovatyy, A., Zvarych, I., & Zvarych, R. (2018b). Circular economy in the context of alterglobalization. *Journal of International Studies*, 11(4), 185-200. doi:10.14254/2071-8330.2018/11-4/13

Mas-Tur, A., Guijarro, M., & Carrilero, A. (2019). The Influence of the Circular Economy: Exploring the Knowledge Base. *Sustainability*, 11(16), 4367. https://doi.org/10.3390/su11164367

Prokić, D. (2019). *Upravljanje zaštitom životne sredine i rizicima sa osvrtom na poljoprivredu* (*Environmental and risk management with reference to agriculture*). Sremska Kamenica: Univerzitet EDUCONS, Fakultet zaštite životne sredine.

Radivojević, A. (2018). Cirkularna ekonomija implementacija i primena tehnologije u njenoj funkciji (Circular Economy Implementation and Technology Application in Its Function). *Ekonomske ideje i praksa*, (28), 33-46.

Rađenović, T., & Krstić B. (2020). The Importance of Intellectual Capital for the Sustainable Growth of Regions: Evidence from the Republic of Serbia, in: J. M. Palma-Ruiz, J. M. Saiz-Álvarez and Á. Herrero-Crespo (Eds.), *Handbook of Research on Smart Territories and entrepreneurial Ecosystems for Social Innovation and Sustainable Growth* (pp. 84-106). Hershey PA: IGI Global, DOI: 10.4018/978-1-7998-2097-0.ch006.

Sagić, Z. (2016). *Inovacije i preduzetništvo (Innovation and entrepreneurship)*. Užice: Visoka poslovno-tehnička škola strukovnih studija.

Stipić, V. V. (2017). Circular economy as an engine for economic development and reducing the impact of the crisis. In *Dani kriznog upravljanja*. Nađ, I. (Ed.). Velika Gorica: Veleučilište Velika Gorica, 2017. (pp. 722-734).

Turner, C., Moreno, M., Mondini, L., Salonitis, K., Charnley, F., Tiwari, A., & Hutabarat, W. (2019). Sustainable production in a circular economy: a business model for re-distributed manufacturing. *Sustainability*, 11(16), 4291. https://doi.org/10.3390/su11164291

Yuan, Z., Bi., J., & Moriguichi, Y. (2006). The circular economy: A new development strategy in China. *Journal of Industrial Ecology*, 10(102), 4-8. https://doi.org/10.1162/108819806775545321

Zečević, M., Pezo, L., Bodroža-Solarov, M., Brlek, T., Krulj, J., Kojić, J., & Marić, B. (2019). A business model in agricultural production in Serbia, developing towards sustainability. *Economics of Agriculture/Ekonomika poljoprivrede*, 66(2), 437-456. https://doi.org/10.5937/ekoPolj1902437Z