Cardinal Stefan Wyszyński University in Warsaw
Institute of Philosophy
Center for Ecology and Ecophilosophy

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Circular Economy Education – Challenges for Poland in the Context of Good Practices

Edukacja w zakresie gospodarki obiegu zamkniętego – wyzwania dla Polski w kontekście dobrych praktyk

Agnieszka Klimska
Institute of Pedagogy, Cardinal Stefan Wyszyński University in Warsaw, Poland
ORCID https://orcid.org/0000-0002-9115-9492 • a.klimska@uksw.edu.pl
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Abstract: The article describes the circular economy (CE) model within the context of the idea of sustainable development, primarily in relation to the implementation of the 2030 Sustainable Development Goals. The main goal of the article is to show and evaluate the activities that are carried out in Poland regarding the implementation of the CE model in business and assess the development of circular economy education. On their basis, it can be concluded that actions for CE are being undertaken in Poland more and more often. However, the pace of their introduction is not satisfactory. Education is one of the key tools determining the success of the implementation of the circular economy model into practice. While circular economy education is developing in many European countries, there are not many initiatives in this area in Poland. In response to this, some possible directions for popularizing CE through education were recommended at the end of the article.

Keywords: circular economy, circular economy education, sustainable development, education in Poland

Streszczenie: W artykule opisany został model gospodarki obiegu zamkniętego (GOZ) w kontekście idei zrównoważonego rozwoju, przede wszystkim w odniesieniu do realizacji Celów Zrównoważonego Rozwoju 2030. Zasadniczym celem artykułu było natomiast ukazanie i ocena działań jakie dokonywane są w Polsce w zakresie wdrażania tego modelu oraz rozwijania edukacji ukierunkowanej na kwestie gospodarki obiegu zamkniętego. Na ich podstawie można wywnioskować, że w Polsce coraz częściej podejmowane są działania na rzecz GOZ. Tempo ich wprowadzania nie jest jednak zadawalające. Edukacja jest jednym z kluczowych narzędzi przesądzających o powodzeniu procesu implementacji modelu GOZ do praktyki. Podczas gdy w wielu krajach europejskich rozwija się edukację w zakresie GOZ, w Polsce niewiele podejmuje się inicjatyw w tym obszarze. W odpowiedzi na ten stan, w końcowej części artykułu, zarekomendowano pewne możliwe kierunki popularyzowania GOZ za pomocą edukacji.

Słowa kluczowe: gospodarka obiegu zamkniętego, edukacja w zakresie gospodarki obiegu zamkniętego, zrównoważony rozwój, edukacja w Polsce

Introduction

The awareness of the need to adopt a rational attitude regarding the use of natural resources is gradually increasing. It is noticeable especially in the sustainable development policy, which emphasizes the socio-economic development, yet takes into account the state of the natural environment. The implementation of its assumptions through global strategies is frequently becoming the practice of individual countries. Sustainable development is the basis for many documents, the guidelines which are implemented at various levels, most often with indiscernible effect. The world economy is still based primarily on a linear model of production and consumption, which affects contemporary ways of dealing with waste. Waste management is one of the priorities of the European Union. For this reason, the rules defining the waste management strategy are constantly being developed, implemented, and improved. The basic principle is the hierarchization of waste management methods. Waste management in many EU countries requires a new approach; one such approach is illustrated in EU documents which introduce the Circular Economy (CE) model. This article will describe the CE concept with particular emphasis on the role of implementing a waste management system in accordance with its principles.

1. Circular economy assumptions

The circular economy, although it began to develop more widely in the 21st century, is a concept that dates back to the early 1970s. Its assumptions can be found in the works of W.R. Stehel and G. Reday, who presented the theoretical basis of CE, pointing to its advantages, such as economic competitiveness, cost savings, and reduced waste. The authors showed that "economy in loops" can become a way of saving energy and creating jobs (Stahel and Reday-Mulvey 1981). Thereafter, in the second half of the 1980s, Stahel and Börlin published the report *Economic Strategies of Durability – longer product-life of goods as waste prevention strategy*, in which they argued for the legitimacy of moving away from the concept of a linear economy. They showed that enterprises taking into account CE assumptions have a chance to achieve higher profits (Stahel and Börlin 1987).

An important voice in the discussion to adopt the concept of the circular economy and to follow its principles was the book *Economics of Natural Resources and the Environment* published in 1990 by Pearce and Turner. It presents the problem of the natural environment as an assimilator of waste. The environment itself creates a closed system and directly absorbs the waste it generates. However, it is not able to absorb waste from production and consumption and thus becomes a waste container. The authors considered it necessary to move from traditional to circular economy, which proposes an appropriate relationship between the natural environment and the economy (Pearce and Turner 1990). They based their concept on the views of Boulding, who (in his 1966 article "The Economics of the Coming Spaceship Earth") describes the Earth as a closed system with limited assimilation capacity, requiring a balance between the economy and the natural environment.

In the economic policy of the European Union, the concept of the circular economy is presented mainly as a strategy to achieve a waste-free economy. This approach is visible in the document *Towards a Circular Economy: A Zero-waste Programme for Europe* (European Commission 2014). The CE concept has not been specified, it is believed to be synonymous with "closing the loop" – the process of prolonging the life of products by increasing recycling, i.e., reusing products, while achieving benefits on both economic and environmental levels. The idea of circular economy in the adopted document is to close the product life cycle by abandoning the linear model (the so-called "from cradle to grave") based on the sequence: production – use – waste disposal. The "from cradle to cradle" strategy

is proposed, in which, instead of waste disposal, the product is meant to be used in the next production cycle. This means that at the end of the life of a product, it is being recycled and can be reused, in a different form and often in a new way. The theoretical foundations of this concept gained recognition, inter alia, thanks to W. McDonough and M. Braungart. The idea of "from cradle to cradle" and the practical implications of this concept are presented by the authors in the book *Cradle to Cradle: Remaking the Way We Make Things* (McDonough and Braungart 2002). They pointed out the importance of an effective product design, so that its outcome does not harm the natural environment, neither does it exhibit harmful effects after being exploited, thanks to the increased efficiency and productivity of items. All of these guidelines involve elimination of waste, the use of renewable energy sources, dissemination of diversity by managing water use, promotion of healthy ecosystems, or respect for the locality, and refer to social responsibility in the context of actions undertaken and relationships formed with stakeholders.

It is recognized that CE allows maintaining the balance between economic development and environmental protection while paying great attention to the efficient use and recycling of resources. Its aspects being highlighted include low energy consumption, low emissions, and high productivity.

While analysing the topic of CE, Prieto-Sandoval, Jaca, Ormazabal noticed that the research focuses on: circular business models (Bocken, Lewandowski), the reduce, reuse and recycle (3Rs) taxonomy (Sihvonen, Ritola), and value creation throughout the supply chain (Schenkel). In addition, some researchers present the relationship between CE and the idea of sustainable development (Geissdoerfer). The author concluded that "generally, the CE is outlined as a cycle of the extraction and transformation of resources and the distribution, use, and recovery of goods and materials". Moreover, CE concerns three levels of research and implementation: micro, meso and macro (Prieto-Sandoval, Jaca, and Ormazabal 2018). For these reasons, it is difficult to clearly define CE. Various CE terms are presented as a result of the interpretation of the concept within such disciplines as: economics and business, ecology, environmental protection, engineering, etc.

One of the best-known definitions of CE is the one proposed by the Ellen MacArthur Foundation, under which CE is considered to be "an industrial economy that is restorative or regenerative by intention and design". The Foundation emphasizes that the transition to CE is not only about reducing the negative effects of a linear economy, but above all, a systemic change aimed at creating long-term resilience, generating business and economic opportunities, and providing environmental and societal benefits (Ellen MacArthur Foundation 2022).

Geissdoerfer, aware of interdisciplinary approaches to CE, defines it as "a regenerative system in which resource input and waste, emission, and energy leakage are minimized by slowing, closing, and narrowing material and energy loops". This can be achieved through long-lasting design, maintenance, repair, reuse, remanufacturing, refurbishing, and recycling (Geissdoerfer 2017, 757-768).

There is also a more detailed understanding of CE worth acknowledging, taking into account four essential elements:

- recirculation of resources and energy, minimization of resources demand, and recovery of value from waste,
- a multi-level approach,
- its importance as a path to achieve sustainable development,
- its close relationship with the way society innovates.

Based on the aforementioned components, Prieto-Sandoval, Jaca, Ormazabal formulated the following CE definition: "(…) an economic system that represents a change of paradigm in the way that human society is interrelated with nature and aims to prevent the depletion of resources, close

energy and materials loops, and facilitate sustainable development through its implementation at the micro (enterprises and consumers), meso (economic agents integrated in symbiosis) and macro (city, regions, and governments) levels. Attaining this circular model requires cyclical and regenerative environmental innovations in the way society legislates, produces, and consumes" (Prieto-Sandoval, Jaca and Ormazabal 2018, 610).

The transition from a linear to a circular economy is not about completely changing the current economy and creating a new one, but about gradually transforming it. It is connected with the creation of new action strategies and business models, and also with increasing awareness of the need for conscious use of resources and implementation of the principles of sustainable consumption. The reorientation of the economy from linear to circular requires implementing changes in the value chain both at the product design stage, incorporation of the right methods to transforming waste into resources, as well as in consumption (European Commission 2014). The implementation of its core concepts requires a long-term involvement at all levels: national, regional, local, within enterprises, along with general and individual social actions.

2. The circular economy concept as an element of the sustainable development strategy

Sustainable development is a priority for global development policy, including the European Union. Achieving it is being sought through, inter alia, combining socio-economic development with environmental protection. The idea to implement the assumptions of sustainable development is ultimately to improve quality of life for present and future generations. The contemporary ways of achieving prosperity; namely excessive consumption, or resource-intensive production, have resulted in excessive exploitation of natural resources, generating threats to both the natural environment and man himself.

In order to ensure the sustainable development of the EU, it is necessary to use natural resources in a well thought out manner. The linear economic model we have relied on so far is not appropriate for modern societies in a globalized world. Not all natural resources are renewable, so an ecologically and economically sustainable way to use them must be found.

The implementation of CE is a key contribution of the European Union to the efforts of creating a sustainable, resource-efficient, low-emission, and competitive economy.

CE corresponds to the principles of sustainable development, such as:

- protecting the environment by preventing biodiversity loss and reducing greenhouse gas emissions,
- creating a low-carbon economy that is more competitive and uses natural resources rationally and cost-effectively,
- promoting sustainable consumption and supporting consumers in making informed, pro-environmental choices,
- introducing operational energy networks,
- improving the conditions for the development of sustainable entrepreneurship.

In the existing literature on the subject, in the context of the idea of sustainable development, CE is more and more often being presented as, inter alia, part of a sustainable economy model. This concept is in accordance with the proposition to look at the change in the economy from an ecological perspective, the essence of which is to take into account the natural resources considered as one of the elements of production. This model emphasizes that with the loss of natural resources, not only the living conditions deteriorate, but also the measurable financial losses, in the form of costs incurred due to the necessity to restore the previous conditions, are suffered.

As early as in the 1970s, scientific evidence and numerous justifications for the legitimacy of changing neoliberal theories that ignore the issue of natural resources in

processes aimed at economic growth have appeared. At that time, there was a conviction that the natural environment should not constitute any barrier to the design and use of technical solutions adopted in a development strategy that is convenient for humans (Woodhouse 2002, 140-141).

Adoption of the assumptions of sustainable development was associated with resignation from the technocratic approach, which was based on traditional models of growth and prosperity. Criticism of the existing paradigms in the fields of production and consumption and the current developmental trends, resulting in the degradation of the natural environment, led to the development of theories such as the ecological theory of development (Payne and Phillips 2011, 158), and then to the gradual introduction of mechanisms and methods of operation enabling further socio-economic development while obeying the laws of nature. Thus, there has been a paradigm shift from mechanistic-deterministic to ecological, which challenges reductionism, one-sidedness, or unambiguity, and perceives reality in systemic, global, and interdisciplinary terms (Kiełczewski 2001, 52-54).

CE is part of the ecological paradigm included in the idea of sustainable development, defined by D. Kiełczewski as a holistic breakthrough (Kiełczewski 2003, 345), characterized by a comprehensive consideration of internal connections and interdependencies between individual parts of the biosphere. This concept aspires to preserve nature and takes into account the principles of its functioning, out of the concern about the current and future quality of human life, as well as due to the recognition of the intrinsic value of the natural environment. In addition, CE incorporates human fulfilment in the social, technicalized, and urbanized environment along with the relationships between man/society and the natural environment. Thus, it recognizes that all economic activity takes place in the socio-natural environment.

CE is often presented as a way to achieve sustainable development. For this purpose, comparative studies of CE and sustainable development are also carried out, exposing their conceptual convergences and divergences within the fields of epistemology, methodology, and practical implications. The concepts are similar as regards e.g., their global character, identification of threats resulting from the current state of industrial technology, production and consumption, introduction of systemic changes, and the way of perceiving the direction of further economic progress. Moreover, both CE and the concept of sustainable development are presented as intra- and intergenerational commitments and they consider it necessary to cooperate with various stakeholders in order to make particular assumptions a reality. Contrastingly, the differences were apparent in, inter alia, goals, motivations underlying both concepts, their timeframe, and beneficiaries, thus pointing to a broader scope of sustainable development. The Sustainable Development Goals are being adjusted to and focused on the current global problems. CE objectives relate closely to the issue of minimizing waste generation by "closing the loop" of the product life cycle (which consists of product life phases: acquiring and processing raw materials, product manufacturing, distribution, use, post-consumer waste management) by increasing recycling and reuse. For this reason, the main beneficiaries of CE are economic entities, which, by implementing the CE system, bring benefits to the economy and the environment. An indirect recipient is also the society, which benefits from environmental improvements. The practice of sustainable development can bring direct benefits to the economy, society, and the environment (Geissdoerfer 2017, 757-768).

When comparing sustainable development with CE, Sauvé, Bernard and Sloan noted that: "sustainable development sets broad inter-generational objectives and, although it is often associated with the internalization of externalities and a set of policy

instruments to do so in practice, the core concept of sustainable development stays silent on the manner to reach sustainability. For its part, the circular economy comes with a set of tools that may be used for sustainable purposes, but the final objective remains unclear and certainly narrower than sustainable development. In particular, the circular economy puts the environmental sustainability forward, acknowledges the need for a favourable economic context (the circular model), but the social objective is usually absent" (Sauvé, Bernard and Sloan 2016, 54).

As in the case of sustainable development, the implementation of CE requires long-term activity at all levels: national, regional, local, as well as entrepreneurial and societal involvement. Its realization also influences the implementation of the 2030 Agenda for Sustainable Development. However, in order for CE to become a path to sustainable development, according to Andersen, "the establishment of a future trajectory for a circular economy will require that this approach be extended so that the broader issue of sustainability can be addressed more comprehensively" (Sauvé, Bernard and Sloan 2016, 54).

3. Circular Economy as a challenge for Polish business

According to Zarębska, CE can be a path to sustainable development, provided that its activities are synchronized and its three pillars (the state, the enterprises, and the society) are properly communicated (Zarębska 2017, 290). The tasks of the state come down to creating plans and strategies for actions for sustainable development, implementing EU documents in line with the vision of economic development of Europe. Great importance should be attached to enterprises on which the progress in implementing CE depends, inter alia, through the realization of the 5R principle (Reduce, Reuse, Recycle, Recover, Renew), or the usage of integrated management systems, such as Best Available Technique or Environmental Technology Verification. In Poland, the level of awareness of all stakeholders, including business leaders of the most progressive companies, is increasing every year. Thanks to what Bolesław Rok emphasizes, "(...) opportunities arise to create sustainable value through the rational use of resources, that is, a closed-loop economy" (Rok 2019, 9). This is an enormous challenge for Polish enterprises, which, according to the author, will consist of transitioning to a "slightly more" circular economy. This involves the structural transformation of business models and changing some management functions in order to reduce material consumption, increase resource efficiency, minimize production-related emissions through the use of environmentally friendly technologies, etc. (Aluchna and Rok 2019, 19-36). Good practices of Polish enterprises, as well as foreign companies operating in our country, are promoted, which increases the interest in CE. As part of the Responsible Business Forum, over a dozen companies operating for sustainable development, including CE, were presented. As far as Polish companies are concerned, it is worth emphasizing the activity of the CCC group, one of the leading footwear brands in Europe. In 2020, the CCC Management Board adopted the CCC Group's Sustainable Development Strategy for 2020-2022. The document is the fifth pillar of the GO.22 Business Strategy and focuses on the following areas: responsible product, environmental responsibility, responsibility towards employees, and society. Based on strong ethical foundations, the company takes into account the welfare of the social and natural environment by offering safe and high-quality products, manufactured with the awareness of the source of the materials. The CCC Group implements environmentally friendly processes, takes care of the rational and responsible use of natural resources, and cooperates with ecological institutions. It identified as priorities: reducing greenhouse gas emissions, energy consumption, and the amount of waste generated, increasing

energy efficiency, implementing the principles of circular economy, and ensuring a "sustainable packaging environment" (Corporate CCC 2021).

Another thing worth emphasizing is the commitment of a company operating in Poland, called Stena Recycling, which is a leader in complex services for effective waste management. The main goal of the company is to optimize waste management systems, as well as to increase the quality of recycling by selecting the best processing methods for specific types of waste. Moreover, Stena Recycling is involved in activities promoting the idea of a circular economy. It is the organizer of the "Stena Circular Economy Award" competition, which rewards practices promoting and implementing CE principles in a business environment. Additionally, it recognizes and awards student projects and initiatives aiming at implementing the idea of CE in society. Stena Recycling, in cooperation with Kohler & Bovenkamp, implements innovative solutions enabling optimization of waste management systems in enterprises, following the example of the best Scandinavian methods. As a result, materials that were previously treated as waste also return to the circulation of materials (material loop) (Rok 2019, 9).

In Poland, there are more and more initiatives emerging, which integrate the scientific, business, and social environments in order to implement the CE assumptions. Extremely well-aimed and effective activity in this area was undertaken by B. Rok, a representative of the scientific community, director of the Centre for Business Ethics and Social Innovation at Kozminski University in Warsaw, in cooperation with Maria Andrzejewska, General Director of the UNEP/GRID-Warsaw Centre. They created the Climate Leadership Program as a response to the challenge expressed in the 2019 resolution (UNEP/EA.4/Res.5) "Solving Environmental Problems Through Sustainable Business Practices". This was an appeal to the private sector to intensify efforts regarding implementing, scaling up, and replicating sustainable business practices. Climate Leadership is a program that builds a community of leaders implementing real changes in business in order to achieve climate neutrality and sustainable development. It was officially presented in autumn 2019 in Poland and at the Assembly of the Governing Consortium of the UN Science-Policy-Business Forum on the Environment in Canberra, and from the very beginning met with appreciation and great interest.

The creators of Climate Leadership noted that "if we are to have any chance of stopping the climate crisis, the business must take radical steps at the level of basic products and services, production and management processes, and even business models. The transformation of production and consumption patterns will affect the very core of business models, forcing more efficient use of raw materials and specific, measurable actions to reduce greenhouse gas emissions" (Climate Leadership 2022). The first edition of the program ended in 2020 and confirmed the readiness of the business to cooperate with program experts, i.e. the representatives of the scientific community and non-governmental organizations, in order to reverse the course of events and "show how our intellect and creativity, as well as technological progress, can be used to build the future that will be the result of the actual – and not only declared – following the principles of sustainable development" (Andrzejewska and Rok 2020, 5).

In the premise of the program, the companies were to propose projects regarding undertakings that could lead to achieving climate neutrality. It was supposed to be achieved directly or indirectly, e.g., by limiting negative impacts on the climate through closing the circulation of raw materials and maximizing the use of production waste. Experts, after getting acquainted with the company's project and a collective discussion, were issuing recommendations in the form of specific solutions that the company could

implement. The following companies benefited from the effects of expert panels and developed solutions in the first edition of the program: Auchan Retail Polska, BNP Paribas Bank Polska S.A., Bank Ochrony Środowiska S.A., Carrefour Polska Sp. z o. o., Coca-Cola HBC Polska, ERGO Hestia S.A., Orange Polska, Żywiec Group, IKEA Retail Sp. z o. o., IKEA Distribution Services S.A., Żywiec-Zdrój S.A.

Auchan, as part of the strategy developed for 2020-2022, is combating, inter alia, the overuse of plastic. The company plans that 100% of its label packaging will be reusable, recyclable, or compostable by 2022. Carrefour Polska has similar goals, assuming the introduction of this type of packaging by 2025, as well as reducing the weight of synthetic material packaging by 300 tons (Centrum UNEP/GRID-Warszawa 2019, 16-24). In its mission, the company strives to transform the model of plastic packaging management into a circular economy model. As the first retail chain in Poland, Carrefour joined the Pact for Sustainable Use of Plastics – a project implemented in regard to the 17 Sustainable Development Goals Campaign.

The CE concept is also important for the banks. Bank Ochrony Środowiska S.A. as "Polish Eco-Bank – for the people, business and environment" is the market leader setting trends for other financial institutions in our country. For almost 30 years, it has been implementing pro-ecological investments, influencing the improvement of the condition of the environment in Poland, such as the construction of installations for waste neutralization and management with a total capacity of over 7 million tons per year.

In 2018, Coca-Cola HBC developed and implemented the Mission 2025 program concluding the sustainable development plan for the company. One of the areas the company focuses on is "World Without Waste". As part of the adopted postulates and efforts in implementing the CE assumptions, Coca-Cola intends to achieve the following goals by 2025: 100% of this brand's packaging that reaches the consumer market will be recyclable; 35% of PET bottles will be made from recycled material; cooperation in obtaining 75% of the equivalent of the packaging produced by the company, which goes to customers, will be enhanced. The slogan "circular brewery" describes the activities of Żywiec Group regarding its efforts in implementing the CE guidelines. Following the idea of zero waste, the company's objective is to close the loop. In practice, this would mean that the beer whose expiry date has been exceeded, instead of being disposed of, would be used for other purposes. Żywiec Group has developed a sustainable development strategy called "We Brew a Better World", which clearly defines the company's priorities and its commitment to the social and natural environment, including goals related to CE (Centrum UNEP/GRID Warszawa 2019, 24-31).

In Poland, the interest in CE and the involvement of companies in activities for sustainable development is growing. This is especially visible in the innovative business models of circular startups (Rok and Kulik 2021, 339-358). As emphasized by E. Jastrzębska, CE means changes not only in action, but above all – in thinking. A sustainable perspective must be taken into account already at the design stage, which will set the direction for further technological and system solutions (Jastrzębska 2018, 225). The CE rules more and more often harmonize with a more popular concept in Poland, namely corporate social responsibility (CSR), and are associated with the responsibility of companies for the impact they have on the social and natural environment.

4. Circular Economy Education in Poland

Companies operating in Poland do not only implement internal strategies of responsible businesses or sustainable enterprises. Increasingly, they see the need to educate employees and customers on the benefits of using environmentally friendly technologies. Creating company plans, e.g., to reduce the carbon footprint or to close

the loop, contributes to a positive image of the company and allows for the increase of the awareness and sensitivity of consumers towards environmental issues.

Understanding the CE concept requires not only the development of environmentally friendly knowledge and technologies but also values and attitudes that determine positive actions regarding the achievement of "zero waste" or motivate to implement the principles of this economy. Circular economy education covers a wide area of activity, e.g., undertaking initiatives related to waste management and counteracting climate change, or the protection of biodiversity.

In Poland, education in the field of CE is poorly developed. Although the need to educate for sustainable development and shaping pro-environmental attitudes is recognized, it is not reflected upon in educational programs. In this area, the transfer of knowledge and skills to the school children (including early-school age) mainly comes down to showing the methods of proper waste segregation. This direction in education is carried out on two levels: formal (in school) and informal (beyond school).

Non-governmental organizations dealing with the recovery and recycling of materials may prove particularly helpful in achieving the objectives associated with the CE concept. Thanks to their educational activity, they can support society in transforming its current practices into environmentally friendly ones. In Poland, informal education provided by NGOs primarily consists of public information campaigns and projects connected to sustainable development, including waste management, or activities addressed to companies. Postgraduate studies in the field of CE have been available on the educational market for several years, dedicated primarily to business representatives (e.g., "Business strategies in a circular economy", conducted at the AGH University of Science and Technology in Krakow; "Principles of sustainable development for business" and "CSR. Sustainable Development Goals in the company's strategy", offered by the Kozminski University in Warsaw). Similarly, to the studies offered in other European countries, such as: "Circular Economy and Sustainability Strategies" at the University of Cambridge, "Sustainable Science and Technology for Circular Economy" at the University of Padova, they are dedicated to employees of companies using or implementing the CE model. These programs help to understand business solutions for sustainable development and their recipients learn to manage business in a sustainable manner and incorporate CE principles into the company's strategies (University of Cambridge 2022).

The Silesian University of Technology in Poland has created a full-time study course "Closed Circulation Economy", responding to the needs of sustainable development of society. This is the single field of study in this country where CE specialists are being educated in the belief that CE is an emerging trend in the most developed countries, which will become a binding practice in the near future (Politechnika Śląska 2022).

However, it is important to emphasize that in Poland, there is a substantial gap in education for CE, namely the lack of programs that would enable teaching these ideas from an early age (in primary and secondary schools). Schools are a great place to develop knowledge and shape attitudes consistent with the CE concept. Good practice in this area is demonstrated by the "Eco-Schools for Advancing Circular Economy" (E-SPACE) implemented in Slovenia and Latvia. The project is supported by the European company "Lucart Professional", which specializes in "(...) production and development of tissue paper products, air-laid products, MG paper and dispensing solutions. Lucart Professional offers a new approach to improving business performance without compromising the environment" (Eco-schools 2022). In its assumptions, E-SPACE strives to make the CE concept appear in the schooling system. Therefore, its main

objectives are to create a curriculum framework for school education covering the CE issue, development of educational materials regarding CE, training teachers based on the project method, as part of the Eco-School Seven Step program, raising awareness of CE concepts (such as the production cycle, "from the raw material to the final product" process, its use, ways to reuse, reduce, recycle or up-cycle) (Eco-schools 2022).

In Poland, formal education is supported by informal education, in which organizations and institutions offer a variety of lesson scenarios, workshops, and training programs. However, they mainly correspond to education for sustainable development, which is equally poorly developed in formal education. Therefore, the issues related to CE appear in the schooling system, but only as a bonus alongside the elaboration on the SDGs. Consequently, it is vital to extend the scope of CEE and draw on good practices. For example, the "Junior Expert in Circular Economy" course was created based on the Italian model of training, implemented by "Higher Technical Education and Training". It is a very interesting initiative dedicated to young Europeans who have graduated from high schools or vocational schools and who neither continue their education, nor undertake work. The course will enable participants to acquire "(...) necessary tools and skills needed for sustainable development and circular transition in economy and society" (Junior Expert in Circular Economy 2021). Poland lacks this type of educational support.

The social dimension of CE is mainly reflected in knowledge and attitudes. An educated society is aware of its role in popularizing an economy that minimizes the use of non-renewable resources, as well as the production of waste and pollution. This may be reflected in the choices made by pro-environmental enterprises, in consumer behaviour favouring eco-labelled products, or in the practice of waste segregation. Therefore, it is crucial to develop and support educational activities aimed at promoting and implementing the CE model, following the example of good practices in other countries.

Conclusion

"There is a significant weakness in the Polish pursuance of the circular economy. Each group chooses a different path. As a result, we lose the chance to quickly introduce the circular economy." This statement echoed strongly in the document *Poland's Road to a Circular Economy. Description of the Situation and Recommendations*, published in 2017 (Instytut Gospodarki o Obiegu Zamkniętym 2017, 7). Successful implementation of the CE model largely depends on education. While CEE is developing in many European countries, in Poland CEE is taught only as part of education for sustainable development, implemented on a small scale.

The current system of school education, inadequate to the socio-economic changes, requires modification so that it can be compatible with the requirements of the current labour market and the natural environment. Implementation of the CE principles is associated with shaping the society of permanent education – the knowledge society – which will be able to have a real impact on economic practice in the field of CE. Therefore, the CEE model should appear in the curricula and educational content prepared for primary and secondary schools and be adapted to socio-economic processes.

The so-far functioning educational systems do not fully correspond to the challenges of the modern world. Education is essential in shaping the future, supporting human development, and solving social problems. This is why, for some time now, the educational system has been undergoing modification in order to adjust education to socio-economic processes. The entire educational process should contain attributes that affect the efficiency of operation, i.e., purposefulness, rationality, efficacy, effectiveness, and attractiveness. Purposefulness is related to the selection of a specific educational project

and the implementation of tasks planned in connection with it. Rationality is understood as a principle of operation that covers a specific body of knowledge and methods of logical inference (deduction and induction). Efficacy means the relation between the benefits of the project and the costs related to its implementation. Effectiveness, on the other hand, is an attribute that evaluates the effect of the entire project by checking the degree of completion of each individual objective. It is associated with the transfer and consolidation of information, shaping the attitudes, and triggering specific activities enabling the acquisition of skills (Czaja 2006, 204-207).

In Poland, there is a need for education for sustainable development and for shaping pro-environmental attitudes. Practice shows, however, that issues related to ecological education are still the main (and only) point of discussion in schools. Moreover, in the system of formal education, programs based on the transfer of knowledge prevail. Their value lies in providing facts and information that may change the way students think and behave.

Nonetheless, this approach should be supplemented with a program enabling the acquisition of skills and competences that will motivate recipients to respond responsibly to changes taking place in the social and natural environment. (Batorczak and Klimska 2020, 17-26). The need to develop CEE in Poland is more and more often confirmed by companies that perceive the passivity of consumers towards the activities that these companies undertake on the market in regard to closing the loop.

Education in the field of waste segregation and recycling is currently insufficient. Circular economy education in its assumptions goes further. As part of this education, it is aimed at shaping the attitudes of conscious consumers. The product life cycle is shown and the way it is handled so that it can remain in a closed circuit. However, we will have to wait for the effects of circular education in Poland. It is worth emphasizing the involvement of business communities in CE, which participate in the process of shaping the attitudes of a sustainable consumer. Therefore, greater efforts should be made to develop the education system and raise public awareness of sustainable development and CE, not only environmental protection. CEE is one of the good projects of tomorrow that respond to the challenges of the modern world, which is why it is so vital to develop it and draw inspiration from the practices of other countries.

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