

Circular Economy Business Models and Region's Role in their Implementation

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Abstract. The theoretical and practical aspects of circular business models are studied. The need to transition from a linear to a CE in order to reduce the “ecological footprint” is substantiated. The importance of the main elements of the CE was analyzed: closed cycles, renewable energy, systems thinking. The international strategic documents on the development of the CE were studied. The key points and areas of implementation, which are defined in the Circular Economy Action Plan, have been studied. They are: make sustainable products the norm in the EU; expand the opportunities of consumers and state buyers; pay special attention to such industries as electronics, batteries and vehicles, packaging, plastics, textiles, construction, food products; reduce waste; make cyclicity work for people, regions and cities. The essence of the concept and elements of the business model are characterized: costs for product creation and development, sales organization costs and the way to make a profit. The main types of business models are highlighted: promotional, affiliate marketing, commission pay, trade, crowdsourcing, manufacturer, franchising, “low-touch”, «razor and blades» and marketplace. According to interaction between business, private individuals and the state, there are such business models: business to business, business to consumer, business to government, consumer to business, consumer to consumer, consumer to government, government to business, government to consumer, government to government. The peculiarities of circular business models and their types are characterized: circular supply models, resource recovery models, product life extension models, sharing models, product service system models. On the basis of foreign experience, the peculiarities of the practical application of business models in various spheres and industries are analyzed; their advantages for the producer and the consumer are investigated. The problems of financial support for the development of the CE have been studied.

The necessity of strengthening the participation of regions in the development of the CE is justified; the main areas of activity of the region in this field are outlined.

Keywords: circular economy, linear economy, business model, resource efficiency, sustainable development of the region

Introduction

The implementation of CE becomes increasingly relevant. According to the definition of the World Economic Forum, the CE is “a renewable industrial system; it replaces end of service life with restoration, moves to use of renewable energy, eliminates the use of toxic chemicals that impair reuse and return to the biosphere, and aims to eliminate waste through the design of materials, products, systems and business models” (Circular Economy: Definition, Principles, Benefits And Barriers, 2020).

The publication of the report “The Limits to Growth” by the Club of Rome in 1972 became an important stage of formation of the CE concept. The publication was focused on the problems of resource depletion and pollution. The authors of the report substantiated the need for product reuse and recycling (Pavlikha, Korneliuk 2022).

The recognition of the importance of resource conservation and recycling is related to the concept of “ecological footprint”, which indicates that the planet needs more than a year and a half to restore those resources that are consumed during the year. The concept of the ecological footprint emerged in the early 1990s and began to be used as an indicator of the rising tension between the economy and the environment. Before the emergence of the concept of ecological footprint, the IPAT formula was used to evaluate the human impact on the environment. It describes the interaction between the population (P), affluence (A) and technology (T): $Impact (I) = P \cdot A \cdot T$. The population factor is controversial because low-income countries have growing populations but relatively low ecological footprints. It is particularly important after Covid-19 pandemic which was underlined by UNEP Resource Panel (International Resource Panel, 2019). Many studies conducted by international organizations and various research institutions warn against the increasing climate instability, over-exploitation of important ecosystems and natural resources, and pollution, which causes significant damage to ecosystems and human health. Thus, there is an urgent need to transition to a CE, i.e. to the regenerative industrial system (Viikman, Skonberh 2017),

Definitions of a CE that focus on systemic change emphasize three elements: closed cycles, renewable energy, and systems thinking. Some researchers also consider social inclusiveness to be a necessary part of the CE. Closed cycles provide for the development of production cycles based on the example of an ecosystem, in which there is no concept of waste, as each the remainder can be used to make a new product. Producers take back their production after use and renew them for a new useful life, for which it is important to save the quality of products, components and raw materials as much as possible. The

use of renewable energy sources is one of the conditions of the CE. As with raw materials and products, energy is also stored as long as possible in the CE. It is impossible to recycle energy, so we are not talking about energy cycles, but about “cascading energy flows”, for example, co-production of heat and electricity. System thinking means that every economic entity (company, person) is connected with other entities. Together, this forms a system in which the actions of one actor affect others (What is the definition of a circular economy, 2018).

In 2015, the European Commission adopted the first Circular Economy Action Plan, which included 54 points. Some of them have been completed, others are still being implemented. In March 2020, the European Commission adopted a new Circular Economy Action Plan (CEAP). It is one of the main components of the European Green Deal, new Europe's agenda for sustainable development. The EU's transition to a CE will reduce pressure on natural resources, promote sustainable development and create jobs, and it is a necessary condition to preserve biodiversity and to achieve climate neutrality by 2050 (Circular economy action plan, 2020).

The new Circular Economy Action Plan provides compliance with the circular principles throughout the entire product life cycle. The action plan is oriented on the way products are developed, promotes the sustainable consumption and aims to prevent waste and keep used resources in the economy for as long as possible. The Action Plan introduces legislative and non-legislative measures, and includes the following directions:

- ➡ make sustainable products the norm in the EU;
- ➡ expand the opportunities of consumers and state buyers;
- ➡ pay special attention to those industries that use the most resources and have a high potential for the development of the CE (electronics, batteries and vehicles, packaging, plastics, textiles, construction, food products, etc.);
- ➡ reduce waste;
- ➡ make cyclicity work for people, regions and cities.

The new 2020 Circular Economy Action Plan (CEAP) contains 35 initiatives. As part of the implementation of the Action Plan, the Global Alliance on Circular Economy and Resource Efficiency (GACERE) has been launched, regulations on persistent organic pollutants in waste have been updated, European Commission adopted proposals on green claims and right to repair and adopted a number of other initiatives under the Action Plan (Circular economy action plan, 2020; Tsyrukliarna ekonomika. Plan dii, 2022).

Theoretical aspects of the CE and circular business models are studied by international structures and organizations (European Commission, Ellen MacArthur Foundation etc.), as well as domestic and foreign scientists (Jonker J., Faber N., Haaker T., Churikanova O., Mytsenko I., Shebanin V., Reshetilov H.).

Shebanin V. and Reshetilov H. investigate the theoretical aspects of the CE of the region, determine the advantages of implementing circular principles for the sustainable development of the region. Churikanova O. emphasizes the importance of innovation for circular business models, and also defines the role of regions in their implementation.

Mytsenko I. and Khadzhyrov I. develop a conceptual approach to the study of circular business models in European companies. Pavlikha N. and Kornelyuk O. systematize the experience of foreign companies in implementing various types of business models and suggest using such experience to increase the level of regional development. Yednakovska K. justifies the role of investments in the CE. Tymbaliuk I., Pavlikha N. examine the problems of balancing local budgets to ensure the sustainable development of local communities. Ruda M. and Myrka Ya. analyze the current state and prospects for the development of circular business models in Ukraine.

The purpose of this chapter is to summarize the theoretical and practical aspects of the development of the CE and, based on the successful practices of using business models, to determine the prospects for the implementation of circular business models at the regional level. To achieve this goal, EU documents, websites of leading companies for the introduction of CE, scientific works of Ukrainian and foreign researchers were analyzed.

To determine the advantages, directions and features of the introduction of the CE at the regional level, it is necessary to:

- ➡ investigate the essence and principles of the CE;
- ➡ analyze the benefits of implementing the CE;
- ➡ to analyze the peculiarities of the functioning of circular business models;
- ➡ to investigate the development of the CE in the countries of the European Union;
- ➡ to analyze the prospects for the introduction of the CE;
- ➡ to investigate the influence of various factors on the prospects for the development of the CE;
- ➡ to determine the problems of introducing the CE in the region.

The CE replaces the consumerist linear concept of the economy. In the linear economy, raw materials are mined, which is transformed into a product and then this product is thrown away after use, i.e. the process takes place according to the principles of “take-make-dispose”. The additional value is obtained by using more resources and producing more products. In contrast to the linear economy, the cycles of all resources are closed in the CE. This affects the way value is created and preserved, production sustainability is increased, and various business models are developed (How is a circular economy different from a linear economy, 2019) The business model is a conceptual description of the directions of the company’s operation, features of interaction with customers and ways of obtaining profits by the company (Biznes-model: shcho tse take, yii osnovni vydy i yak vybraty optymalnu, 2020). Different types of business models have common elements that are common to all business models. We depicted it in Figure 1.

Note that when developing a business model, compliance with the main structure is important.

Changes in the competitive environment, individual needs of firms and enterprises led to the emergence of various business models. Well-known types of business models are (Biznes-model: shcho tse take, yii osnovni vydy i yak vybraty optymalnu, 2020):

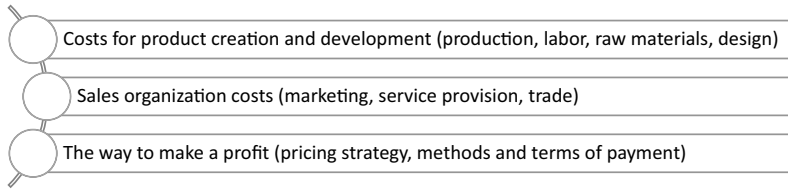


Fig. 1. The elements of the business model
(Business model: what is it, its main types and how to choose the best one, 2020)

- ⇒ *promotional* (it has been used for a long time in the media space, in particular, to cover large volumes of traffic; for its effectiveness, it is important to find a suitable niche);
- ⇒ *affiliate marketing* (the following schemes are used: trade-in banners on partner resources; payment for the transfer of a target potential client; payment for the user's performance of the target action. This business model is used by Ozon and Aviasales);
- ⇒ *commission pay* (payment for the transactions of the participants of the agreement; it is used by real estate agencies, event companies, PR agencies, etc);
- ⇒ *trade* (sales through distributors or using catalogs);
- ⇒ *crowdsourcing* (when a large number of people unite; often this business model is combined with advertising);
- ⇒ *manufacturer* (entrepreneur produces and sells goods on his own);
- ⇒ *franchising* (using a proven, successful and effective business model of another company instead of creating your own);
- ⇒ "low-touch" (minimum participation of the employee in the process of selling the product or service is provided, this allows for reduced prices);
- ⇒ «razor and blades» (the sale of a durable good at a low price close or the cost price, and profit is made at the expense of the sale of disposable components for the product; for example, replaceable razor blades);
- ⇒ *marketplace* (using of trading platforms for both goods and services with income from various sources).

A business model is a demonstration of the features of interaction between various entities (business, private individuals and the state). Local businesses that introduce circular initiatives in the organization of their production can use business models known in modern practice as the basis of their activities (Fig. 2, where B – *Business* (a commercial organization), C – *Consumer* and G – *Government* (state). The first letter of the abbreviation denotes the person who provides or sells services, and the second letter denotes the person who uses or buys them) (Osnovni vydy biznes-modelei z przykladamy, 2018).

The difference between circular business models and traditional ones is that circular models use already existing materials and products as inputs. The circular business models change the structure of product and raw material flows in the economy. They reduce adverse environmental impacts that arise from the extraction, use, and disposal of natural

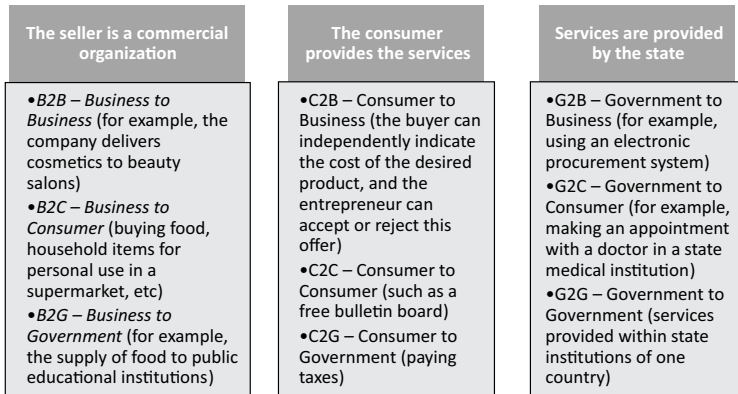


Fig. 2. Types of business models
(Main types of business models with examples 2018)

resources and materials. The use of circular business models helps to reduce the mining and use of natural resources and the accumulation of industrial and consumer waste. They are based on those activities that are necessary for the transition to a resource-efficient and CE. However, the environmental performance of circular business models depends on the scale of their use. OECD research results show that circular business models occupy a small share of the market. Areas such as processing, repair, joint use of reserve capacities and provision of services instead of products account for only up to 15% of production (Business Models for the Circular Economy: Opportunities and Challenges from a Policy Perspective, 2018).

M. Ruda and Ya. Myrka offer the following definition: “circular business model is a general term for completely different business models that seek to use fewer materials and resources for the production of products and services, and also want to extend the life of existing products and services through repair and recovery, end-of-life products through recycling, benefiting from the residual value of products and materials” (Ruda and Myrka 2020).

Figure 3 shows the classification of circular business models.

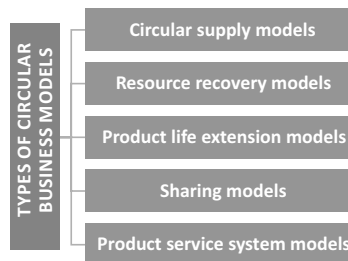


Fig. 3. Types of circular business models*
(Business Models for the Circular Economy: Opportunities and Challenges from a Policy Perspective, 2018)

Circular supply models use biological, renewable or reclaimed materials instead of traditional (often non-renewable) material resources. Thus, the demand for extraction of new resources and raw materials decreases (Business Models for the Circular Economy: Opportunities and Challenges from a Policy Perspective, 2018; Mytsenko, Khadzhynov 2022). An example of this type of business model is Renault, which became the first car manufacturer to start implementing the CE. In 2008, the Renault company created a subsidiary company, Renault Environment, which provides control over automotive waste and parts. As a result, their vehicles are 85% reusable and contain 95% end-of-life components. The share of recycled plastics in production must be constantly increasing. The company's profit from the application of the CE is 0.5 billion euros per year. In today's conditions of shortage of energy resources, it is useful to develop bioethanol production technologies. The raw material for this is agricultural waste. Such projects are used by the Finnish company North European Bio Tech Oy. This provides additional income, helps reduce emissions, create jobs, and strengthen national energy security (Ruda, Myrka 2020).

Resource recovery models recycle waste into secondary raw materials instead of disposal, thereby reducing the need to extract new resources. An example of successful implementation of such a business model is the company Van Werven (Netherlands), which works in the industry and production sector and is a service provider in the field of recycling secondary raw materials. The company processes construction waste, plastic and other waste into biomass. In 2019, the company processed 542,282 tons of waste, achieving a turnover of 100 million euros. The processing of this waste prevented CO₂ emissions by 216,974 tons. Another Dutch company, HKS, specializes in iron, metal and electronics processing. HKS processes 1.8 million tons of scrap per year; with annual sales of 500 million euros (data for 2020). RetourMatras works in industry and manufacturing and recycles discarded mattresses into new ones. The company recycles 1.5 million discarded mattresses a year that otherwise would have been burned. RetourMatras cooperates with companies such as IKEA, Renewi and Auping (Jonker et al. 2022).

Product life extension models are used by Fairphone and Peeze (Netherlands). Fairphone designs reliable phones that last longer by using replaceable modules that consumers can repair themselves. Peeze designs compostable coffee cups and bags, and makes coffee cups from sugar cane waste. Peeze's annual turnover is more than 16 million euros. Coffee is produced with a neutral CO₂ emission (Jonker et al. 2022). An example of product reuse is Algramo's system, which allows customers to refill household goods using smart dispensers and packaging with an RFID chip. In 2020, Algramo brought more than a quarter of a million packages to market, all of which were 100% reusable. Reuse is especially important for plastics because, unlike recycling, it preserves all the resources used in the production process (Pay for the product, not the packaging: Algramo, 2021).

Another good example of the CE is the experience of thredUP. Lots of clothes are thrown into landfills or burned every year. These are material losses, as well as energy, water and other resources used to produce textiles and clothing. The company thredUP

has created an online platform for buying and selling used women's and children's clothing. ThredUP buyers have access to high-quality clothing at low prices from over 35,000 brands. ThredUP sellers send clothing for free, and then thredUP employees process the goods, check quality, and perform price analysis, storage and placement. Customers can get access to brands that they would not otherwise be able to afford. They also earn money from clothes they no longer wear and feel good about reducing their negative impact on the environment. Keeping clothes in use as long as possible is a basic CE strategy in the fashion industry. In 2018, thredUP expanded its platform and provided access to brands and retailers (i.e. started to operate on a B2B model). The popularity of this business model is evidenced by the growth of the company's revenues from 129.6 million dollars in 2018 to 186 million dollars in 2020 (Keeping clothing in use to reduce waste: thredUP, 2022). Similar methods are used by the Vestiaire Collective resale platform for designer fashion. Vestiaire was founded in 2009 to allow individuals to buy and sell second-hand fashion items. The platform's developers also hope to cultivate circular thinking by encouraging their clients to buy better quality and take better care of their clothes to increase their resale value (A global peer-2-peer resale platform for designer fashion: Vestiaire Collective, 2022).

Company Teemill has developed a circular production process that turns old T-shirts into new T-shirts. Every product produced by Teemill is designed to be returned when it wears out or the customer no longer wants to wear it. Teemill's supply chain increases material usage, and reduces chemical and water consumption. Products are made in real-time. The customer makes an online order, specifying the color, size and design. The t-shirt is then printed and sent to the customer. Thus, the final product is produced only when it is needed (An open access, circular supply chain for t-shirts: Teemill, 2022).

Sharing models facilitate the sharing of underutilized products. Such a business model is useful for manufacturers with low utilization rates. It changed the relationship between producer and consumer through the use of C2C (consumer to consumer), B2C (business to consumer) models. Consumers interact directly with each other on online platforms. This model includes transport exchange platforms: the C2C relationship model is used by BlaBlaCar – an international online passenger search service, RelayRides – a car rental service, Airbnb – a platform for renting private housing (Business Models for the Circular Economy: Opportunities and Challenges from a Policy Perspective, 2018; Ruda, Myrka 2020). FLOW2 is a platform where companies and organizations can share, rent and sell unused products, services, waste and materials or leftover materials. Together, users generated €129,154,864 in additional revenue in 2019. Peerby (Netherlands) is a consumer platform that allows you to borrow and lend items. 80% of items are used once a month or less. Peerby lists all the things you can borrow and rent in the area. Thanks to joint use, the need for production is lower (Jonker et al. 2022).

Rheaply uses a B2B model for efficient resource exchange. Rheaply's asset exchange manager allows users to track inventory, sell, donate, or lease items, and provides analytics in the form of a waste diversion report. Rheaply's founder, Harry Cooper, came

up with the idea of sharing equipment while still a student. In this way, he tried to solve the problem of underfunding of research departments of universities. Faculties that had surplus laboratory equipment or other things that were not used, gave it all to those departments that had needs. That's how he came up with the idea of creating an asset redistribution platform that would allow using excess resources. When the equipment is not in use, the Rheaply user can use the shared platform to place the items in another part of the enterprise, campus or school. Data on the platform is generated in the following ways: posting of messages by individual users on the site; batch processing and data loading through integration with ERP (enterprise resource planning) or AMS (automated manifest system). Since its inception, Rheaply's technology has enabled various organizations to save \$1.5 million by leveraging valuable resources internally (Sharing valuable resources more effectively: Rheaply, 2021). Product service system models, where services are sold rather than products, improves incentives for more efficient use of the product, and thereby contribute to the frugal use of natural resources (Mytsenko, Khadzhynov 2022).

Signify, former Philips Lighting, is a multinational corporation that manufactures and sells electric lamps and lighting fixtures. Signify also offers Lighting as a Service (LaaS) to its customers. Under a LaaS contract, Signify installs, operates and maintains the lighting systems, and customers pay a monthly service fee for the lights. The lighting fixtures Signify uses under its LaaS contract are specifically designed to be easily repaired and reused. In this business model, the costs of purchasing equipment are replaced by monthly payments for productivity. Under the LaaS business model, Signify motivates to produce high-quality, durable and modular equipment that lasts much longer, thus conserving resources used in production. In addition, because the light is often professionally managed with the help of artificial intelligence and the Internet of Things, the system works more efficiently, resulting in significant energy savings. Signify's "circular" lights last 75% longer than conventional fixtures. Lighting consumes approximately 15% of global electricity demand and generates 5% of global greenhouse gas emissions. By implementing lighting-as-a-service business models, it is possible to increase the provision of light to those who need it, while avoiding large volumes of waste and greenhouse gas emissions. Signify has an annual revenue of €6.5 billion (2020).

The company MUD Jeans offers to use a pair of jeans for a fixed amount per month, after which the consumer is motivated to return the jeans. The company's turnover was 1.6 million euros (2020) and 45,000 pairs of jeans were sold (Jonker et al. 2022; Why buy light bulbs when you can buy light: Signify, 2021).

Gerrard Street has introduced a subscription service for its modular headphones. The modular design allows the reuse of 85% of components. The subscription model allows Gerrard Street to restore and recycle headphones at the end of their useful life. This business model aims to reduce the large amount of precious materials and electronic waste that end up in landfills. Gerrard Street can increase its revenue by maximizing the use cycles of each pair of headphones (Headphones as a service: Repeat, 2022).

Kaer supplies air conditioning systems for commercial and industrial properties in Asia. In 2013, the company shifted its business to Refrigeration as a Service (CaaS) with an offering called Kaer Air. Demand for space cooling is growing due to the expansion of the global middle class and rising air temperatures. According to the International Energy Agency, by 2050 air conditioning will account for 13% of global electricity consumption. To avoid this, the energy efficiency of buildings should be improved, and one way is to use product-as-a-service models such as Kaer Air. Kaer uses a modular design approach to add or remove air conditioning units as needed. The advantages of such a model are the reduction of electricity and installation costs. Thus, the CE can reduce electricity shortages (Cooling as a service: Kaer, 2021).

Circular business models are not separate from each other. Clear distinctions between the two are in theory, and practice firms may use combinations of business models. For example, use product maintenance, repair or remanufacturing system models at the same time. The successful implementation of certain types of business models by a firm can contribute to the adoption of corresponding business models by other firms. Recycling, reuse and repair have been around for a long time and are not a new phenomenon. But the diversity and complexity of these business models is growing. By closing resource cycles, circular business models can reduce the environmental footprint of economic production and consumption. Using the business model of resource recovery through recycling, it is possible to reduce greenhouse gas emissions by 90%. The recycling of end-of-life products will make it possible to reduce the extraction of natural resources and the generation of waste by up to 80% compared to the production of new goods.

Reducing the extraction, processing and transportation of natural resources also leads to energy savings. Sharing or renting existing products will reduce the environmental footprint. For manufacturers, retention of ownership may encourage the development of products that have a relatively long life and are more amenable to remanufacturing or recycling at the end of their useful lives. For consumers, paying for services instead of goods can lead to more careful use of things (Business Models for the Circular Economy: Opportunities and Challenges from a Policy Perspective, 2018).

As noted by M. Ruda and Ya. Mirka, circular business models introduce a clear differentiation between consumables and durable product components. In the traditional economy, producers often do not distinguish between them. But in the conditions of the new economy, the purpose of consumables is to use non-toxic and clean components. The purpose of durable components (such as metals and plastics) is to be re-used or refurbished for other production applications. And the role of the consumer should be changed to the role of the user (for the long term). Business also requires a different way of thinking, which is not limited to the desire to sell a product (Ruda, Myrka 2020).

The development of the CE requires significant investment, both to support startups experimenting with new circular business models, and for large-scale projects. According to preliminary estimates, a minimum of \$3.5 trillion per year will be needed to build

clean energy infrastructure by 2050. UNCTAD estimates that developing countries alone need \$3.9 trillion a year to fully meet the UN's Sustainable Development Goals. Financial institutions are aware of their role in the development of the CE and provide the necessary investments and tools. By investing in the CE, they can gain a competitive advantage for themselves. For example, green bonds, which cover several key elements of the CE, have increased more than three hundred times. Companies can also issue "transition bonds" for financial technologies or new business models that support the transition to low-carbon alternatives. Financial services companies are consolidating their leadership positions by investing in the CE. As governments and other stakeholders increasingly recognize the importance of transitioning to a CE, they will put pressure on producers and encourage them to change the way they do business. A leader in the field of circular investments, ABN AMRO (one of the largest banks in the Netherlands) is actively looking for clients. At an early stage, ABN AMRO published a CE guide. The company has also released a set of tools to help facilitate the transition to these new business models. ABN AMRO, ING and Rabobank jointly developed and launched new financial guidelines that could serve as a standard framework for CE investments. These recommendations describe the new forms of necessary capital and explain the financial foundations of circular business models (Yednakovska 2022).

The obstacle is that traditional financing mechanisms and systems are often ill-suited to the transition to a CE. Banks may prefer conventional, more "safe" investments to financing circular projects that are considered more risky. Standards for defining circular companies, products or initiatives are insufficiently developed. One solution is to find partners to maximize the impact of cyclical offerings and share risks. This idea is the basis of the Circular Supply Chain Accelerator (CiSCA), which ING developed together with Accenture Strategy and Circle Economy to accelerate the circular economy. CiSCA supports large multinational companies as their small and medium-sized suppliers move towards circular business models (Yednakovska 2022).

Research by Bain & Company, conducted in conjunction with the World Economic Forum, shows that business leaders increasingly feel the need to adopt circular models. New entrants with innovative business models are emerging in many industries. They recognize that well-designed circular products and business models can accelerate growth, reduce costs and increase sustainability, preparing the enterprise for a low-carbon future. Developing cyclical products or strategies requires new ways of thinking. Most large companies have established broad sustainability goals, but not all have specific goals. And some managers believe that the costs for the transition to a circular way of production do not justify expectations about profits in the future. Despite the significant problems of the circular transition, leading multinational companies have notable successes in this. For example, consumer goods giant Unilever plans to produce 100% reusable or compostable packaging by 2025. Michelin plans to make 80% of its tyres from sustainable materials by 2048, and every tyre will be recycled. Leading companies also set specific revenue targets for circular products and services. Whoever builds a successful circular business model

now will gain a strategic advantage and be able to attract more new markets in the future (The Circularity Challenge: Expect Disruption and Get Out in Front of It, 2022).

Despite the significant environmental potential of circular business models, experts note the need to take into account certain risks (Business Models for the Circular Economy: Opportunities and Challenges from a Policy Perspective, 2018):

- ➡ increased production of biomaterials can cause soil changes and create additional pressure on ecosystems and biodiversity;
- ➡ as a result of recycling, the impact of harmful chemicals contained in secondary materials may increase;
- ➡ a consequence of shared consumption may be a shift away from ecological substitutes (for example, in the transport sector, where consumers may choose to share cars instead of public transport).

However, these warnings should not be seen as threats. To avoid negative consequences in the process of implementing circular models, a monitoring and control system should be followed, which will minimize risks.

Ukraine also joins the process of implementing the CE. Before the full-scale invasion of Russia, Ukraine had already made some progress in implementing circular business models. Ukrainian business models of circular supplies are not yet widespread, as their implementation requires significant investments, which only large companies have access to. It is difficult for smaller businesses to get financing. The regional investment policy envisages investing in innovation, but in practice, this is difficult to implement due to lack of funds. Business models of resource recovery are developing more successfully, in particular, the practice of using waste from some enterprises as raw material for others is used at manufacturing enterprises and processing factories. More common models are C2C (platforms for the sale of used goods), B2C (platforms for hotel and tourism reservation services), B2B. From the side of the region, in this case, a policy of support and stimulation of development is needed in order to cover the largest possible number of industries. European enterprises actively use business models to extend the life cycle of the product, are engaged in the restoration of household appliances, mobile phones, cars, and equipment. Ukrainian manufacturers of similar products do not use this practice, considering it time-consuming and expensive. Ukrainian business models of using a product as a service mainly use imported products, instead, in order to implement circular principles, domestic products should be used. To do this, it should meet European quality standards (Churikanova 2020).

Taking this into account, it is necessary to increase attention to the development of circular business models in Ukraine. This is relevant both for the post-war recovery of the economy and for the continuation of Ukraine's European integration course (Pavlikha, Korneliuk 2019). There is still no clear position on who should coordinate and stimulate the transition to the CE: the state, the region, or individual economic entities. In our opinion, the regional approach to the development of the CE should be deepened. Regions and communities that have received more powers as a result of decen-

tralization are characterized by greater homogeneity and have a better understanding of their own needs and capabilities (Antoniuk 2020; Pavlikha, Korneliuk 2019; Pavlikha et al. 2022).

In our opinion, an effective tool for the effective implementation of strategies and roadmaps for sustainable and smart development of regions and communities is the introduction of various CE business models. This is possible based on the development of public-private partnerships, the cluster form of labor organization and the stimulation of local business participation.

V. Shebanin and G. Reshetilov point out that the CE of the region cannot be implemented by a single institution or company on its own, because by its nature, CE promotes connections between individual stakeholders and sectors of the region (Shebanin, Reshetilov 2021). Therefore, the use of various forms of CE business models by local organizations will allow them not only to diversify their activities but also to take a direct part in achieving the goals of sustainable development of communities and regions in the form of public-private partnerships.

Churikanova O. emphasizes the need to develop the national and regional programs, taking into account the needs of the CE, and believes that the introduction of circular models is an issue that should be resolved at the state and regional levels (Churikanova 2020). The necessary financial resources providing is a prerequisite for business support on the way to circular development. Significant long-term investments are needed to carry out structural transformations in the regional economy (Tsymbaliuk et al. 2021).

The task of regional policy is also informational work to change the consciousness of producers towards the implementation of these business models to have a positive impact on regional and state environmental indicators. Support from the region can also take place by providing preferential business conditions to companies that choose circular development models (Churikanova 2020). For the implementation of circular initiatives, a solution option may be to find partners to share risks and focus on additional sources of funding. In particular, the creation of joint ventures with business entities from neighboring countries can create favorable conditions for the cCE of the regions. In the conditions of war, it is difficult to talk about investment attractiveness, however, the western regions of Ukraine are located relatively far from the war zone and can be considered safer. In addition, it is necessary to develop post-war recovery plans to rationally use future investments. Border regions have additional opportunities to attract investments using cross-border cooperation. An additional source of funding can be cross-border programs and projects, including the use of opportunities for Neighborhood Programs. Analyzing the projects implemented in Ukraine with the support of cross-border cooperation programs, it should be noted that some of them are aimed at ensuring sustainable development, in particular improving ecology, preserving forests and biodiversity, and restoring river ecosystems. However, it is necessary to work on the development of circular projects and business models in production activities. Significant long-term investments are needed to carry out structural transformations in the regional economy and to introduce

a CE in the production of industrial and consumer goods, construction, the transport sector, the food industry and the service sector. One of the directions should also be informational work to change the consciousness of producers towards the implementation of circular business models, spreading the culture of smart consumption and waste management among the population. This can be done by holding joint scientific and practical conferences, organizing training, publishing information materials, and working visits to enterprises in neighboring countries.

The successful implementation of the circular model of development of the national and world economy is possible under the condition of using various business models of the CE at the level of regions and communities, based on public-private partnership. We agree with the opinion of Shebanina V. and Reshetilova G. that the introduction of CE models will strengthen the sustainability of the region's development by reducing dependence on the inflow of resources. The development of the CE will allow the region to move towards a more sustainable, inclusive and low-carbon development model (Shebanin, Reshetilov 2021).

The transition to a CE requires systematic, joint actions of the consumer, business, state and government. The lack of state support at both the national and regional levels makes it difficult to implement circular initiatives. The presence of legal regulations, promotion of circular production and smart consumption, financing of projects, product quality improvement, monitoring and evaluation of progress and results are necessary conditions for the implementation of a CE.

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