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# СВІТОВА ЕКОНОМІКА ТА МІЖНАРОДНА ТОРГІВЛЯ

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## CIRCULAR ECONOMY OF POLAND

*The need to update industrial policy for European countries that brings together existing and new horizontal and sectoral initiatives in the complex was considered. The attention is focused on regional and national characteristics of Poland, which experts welcomed the new environmental requirements associated with the introduction of circular economy, support for the implementation of the environmental management system and auditing, are studying a pilot program on verification of environmental technologies. The term «smart specialization», which marked a new generation of research and innovation policies to motivate entrepreneurs to participate in the process of closing the production cycles at the national level, is highlighted. The conclusion about the necessity of introduction of changes in the tax system of Poland, public procurements, financing, education is made.*

*Keywords:* circular economy, ecological technologies, smart specialization, enterprise competitiveness, sustainable development, ecological management system and audit.

*Шлюсарчик Б., Лехвар М. Циркулярная экономика Польши. Рассмотрена необходимость обновления стратегии промышленной политики европейских стран, которая сочетает существующие и новые горизонтальные и отраслевые инициативы в комплексе. Сосредоточено внимание на национальных и региональных особенностях Польши, которая применяет новые экологические требования, связанные с внедрением циркулярной экономики, системы экологического менеджмента и аудита, пилотной программы проверки экологических технологий. Выделен термин «умная специализация», обозначающий новую исследовательскую*

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*и инновационную политику, которая мотивирует предпринимателей участвовать в процессе закрытия производственных циклов на национальном уровне. Обоснована необходимость внедрения изменений в налоговой системе Польши, государственных закупках, финансировании, образовании.*

*Ключевые слова:* циркулярная экономика, экологические технологии, умная специализация, конкурентоспособность предприятий, устойчивое развитие, система экологического менеджмента и аудита.

**Background.** A circular economy is an economy model in which products, materials and raw materials should remain in the economy for as long as possible and waste production should be minimized as much as possible. This new approach to the economy aims, among other things, to increase in the innovation of European entrepreneurs and increase their competitiveness in relation to entities from other parts of the world [1]. The European Commission in the document «Closing the Circulation – EU Action Plan on Circular Economy» in 2015 proposed to all European Union (EU) Member States to switch from the linear economy model (take, create, and dump) to the circular economy model allowing not only to avoid irreparable damage to the irrational use of resources possessed by the EU, but to increase the competitiveness and long-term development of the European economy by protecting enterprises against resource scarcity and unstable prices [2–3]. The European Commission welcomes the necessity of introducing a circular economy also due to the dependence of the European Union on imports from external rare markets, but essential raw materials that could be effectively recovered from waste [4].

Depletion of raw materials, increase in their prices and growing dependence on suppliers from other countries pose a serious threat to further economic development and a challenge in the context of environmental protection. That is why a comprehensive approach to products and services is so important. It is essential that at every stage of the life cycle, i.e. from the acquisition of raw material, through design, production, consumption, to waste management, the raw material efficiency should be taken into account, both in the context of energy and raw materials necessary for the production. Waste – if must be created – should be treated as secondary raw materials. All pre-waste activities at earlier stages of product or service life are to serve this purpose. The circular economy is a response to the challenges related to limited access to natural resources. In this new economic approach, the value of products and raw materials is retained as long as possible, while minimizing the amount of waste generated [5].

**Analysis of recent research and publications** about the circular economy basically indicates the significant and potential benefits for the economies of EU member states, including reduction of environmental degradation, waste reduction, optimal use of resources, increased energy

security, savings for business, as well as new jobs. The leading position is «Towards the circular economy. Economic and business rationale for an accelerated transition» [6]. It emphasizes, inter alia, that «eliminating waste from the industrial chain by ‘closing the loop’ promises production cost savings and less resource dependence. The benefits are not merely operational but also strategic; not merely for industry but also for users; and not merely a source of efficiency, but also a source of innovation and growth». On the other hand, studies carried out by E. Coats and D. Benton focus on the importance of activities in the field of circular economy for creating jobs and reducing structural unemployment [7].

The European Committee of the Regions’ opinion is equally positive when it writes that it «welcomes the efforts made by the Commission to strengthen the circular economy approach, based on respect for the value of products, materials and resources throughout the life cycle, create a sustainable, low-emission, technologically advanced, resource-efficient and efficient economy, which in the long term will offer competitive advantages and create jobs in Europe» [8].

Similar problems are considered in their works of P. Ghisellini, C. Cialani, S. Ulgiati, A. Tantau, M. Maassen, L. Fratila, V. Ranta, L. Aarikka-Stenroos, P. Ritala, S. Mäkinen, M. Charter [9–12].

The **aim** of the research was to indicate the essence of the circular economy and its potential consequences for competitiveness and long-term development of the European and Polish economy, emphasizing challenges facing the central and regional authorities and enterprises in this respect.

This study assumes that production (industry) and consumption play the main role as a factor of economic growth, employment and innovation in Europe and specific actions ensuring a competitive European and Polish economy at the current stage of development. Such an approach seems to be important due to the fact that European and global industry is undergoing a transformation, as well as an EU target set to increase the share of industry in GDP to about 20 % by 2020 from the current level of 15,1 %. The European industry is crucial for economic growth in Europe and for the economy of the Member States it accounts for 80 % of European exports. It is also essential for the internal market. Europe maintains the competitive advantage of its products and services with significant added value. In order to maintain it, it must maintain its activity, which determines the economic growth [13].

**Materials and methods.** The study uses a documentary method. The method of examining documents in its essence consists in the collection, selection, description and scientific interpretation of the facts contained. It is an analysis based on the separation and subsequent distribution and interpretation of the components of the real action process. The study of acquired documentary material allows determining the actual picture of specific events, facts and achievements [14]. The task of the documentary analysis was to provide information and present the content of the most important documents referring to the subject matter covered in the title,

omitting the critical and assessment elements. A discussing and structured analysis was applied due to the specificity of the topic, for which the most important elements of the content of legal documents are particularly important.

**Results.** Justifying the need to move to a circular economy, the weaknesses of the linear model functioning are indicated, i.e. [15]:

- economic and structural loss (waste) – material recycling and energy recovery from waste in the EU are able to capture only 5 percent of the initial value of raw materials,
- price risk – price changes of metals and agricultural products has been higher in the last decade than in any decade of the 20th century,
- risk of supplies shortage – imports of materials and natural resources in the EU exceed the export six-fold,
- degradation of natural systems – climate change, loss of biodiversity and natural capital, deterioration of soil condition.

A circular economy is an industrial system that is designed to regenerate. The point is that instead of disposing of products, before their value has been fully used, we should use and re-use them [16]. On December 2, 2015, the European Commission adopted the circular economy package including [17]:

- Closing the Circulation – the EU circular economy action plan, which emphasized the innovation of European economy in the context of the transition of EU to the economic model of circular economy;
- legislative part regarding proposals for amendments to the waste directives to lead to the implementation of waste management practices in all EU Member States.

It proposes activities supporting the circular economy at every stage of the value chain, i.e. from production to consumption, repair and regeneration, waste management and secondary raw materials that are re-introduced into the economy. The circular economy package lists five priority areas: plastics; food waste; critical raw materials [18]; wastes from construction and demolition; biomass and bio-products.

The circular economy package is an indication for economic operators that the EU uses various tools to modernize the economy, while creating new business opportunities and increasing the competitiveness. Dynamic actions aimed at changing the entire life cycle of products go beyond the current ones essentially focused on the withdrawal from production. The result of activities carried out in this area should be more and more innovative and effective ways of production and consumption [19].

In the above context, the renewed EU industrial policy strategy combining all existing and new horizontal and sectoral initiatives into a comprehensive industrial strategy is extremely important. The tasks faced by all entities were specified in it. Among the main new elements of this strategy, the issues of using Europe's leading position in a low-emission economy and the circular economy are raised [20]. The circular economy

concept must be at the center of any industrial policy to enable recovery, reuse or recycling with a view to a new product in the context of a sustainable environment [21]. The European Economic and Social Committee believe that the current industrial revolution is based, among others, on a dynamic change in consumer habits and breakthroughs in science and technology. This is accompanied by progress in digitization, circular economy, robotics and new production processes [22–23].

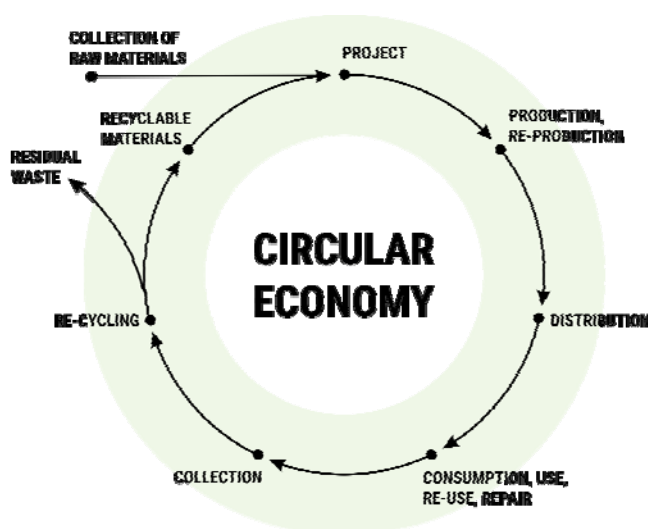
In December 2017, new activities for the circular economy were presented. The European Parliament, the Council and the Commission have reached an agreement on changes to the Waste Directives that are intended to allow the implementation of a circular economy. Directions of changes in EU regulations regarding waste, packaging waste as well as waste storage, including electrical and electronic waste, were developed.

Circular economy is challenges and implementation of EU assumptions in Poland. As underlined by the EU regulatory documents, the implementation of a circular economy will require a long-term commitment at all levels, from Member States to regions and cities to businesses and citizens [24].

In Poland since 2015, the following main priorities for the implementation of circular economy have been identified:

- innovation, strengthening the cooperation between industry and science sector, and, as a result, implementing innovative solutions in the economy;
- creating a European market for secondary raw materials, where their flow would be facilitated;
- ensuring the high-quality secondary raw materials, resulting from a sustainable production and consumption;
- development of the services sector.

The circular economy cycle is shown in *figure 1*.



**Figure 1. Circular economy**

Source: adapted by the authors on the materials [25].

The purpose of the Polish document *Roadmap for transformation towards a circular economy* is the implementation of circular economy goals, but also determination of horizontal activities and separation of activity areas. Four basic ones were distinguished, i.e. «Sustainable industrial production», «Sustainable consumption», «Bio-economy» and «New business models». The operation of circular economy is shown in *figure 2*.

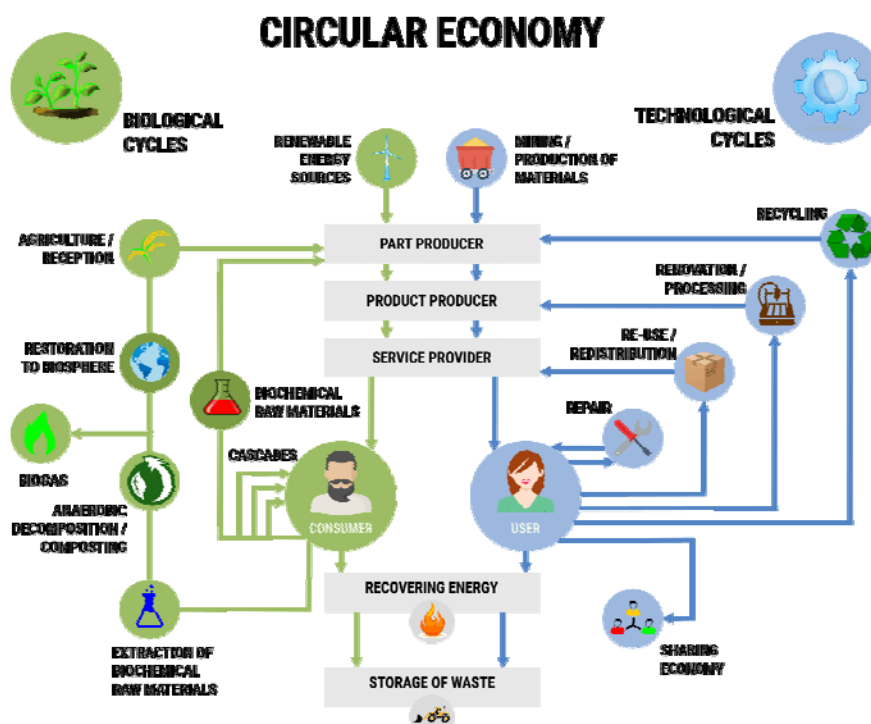


Figure 2. Functioning of circular economy [26]

The below presents the position of Poland on the implementation of the circular economy regarding the initiatives announced in 2015 and contained in the annex to the message Closing the Circulation. The analysis covers only the two most important elements of the economy management process, i.e. production and consumption. Content of the table excludes waste management, market of secondary raw materials and sectoral activities. And the document itself ignores the position of Poland regarding the critical raw materials, construction and demolition waste, biomass and materials of biological origin, innovations and investments.

**Implementation of a circular economy in Poland [27]:**

**Production.** Poland welcomed the new eco-project requirements related to the implementation of the circular economy (e.g. such as material efficiency, durability, reparability, recycling).

If the EC includes the circular economy program in the process of creating BREF reference documents (best available techniques), Poland as a member of the TGR participating in this process, will take into account the requirements of the program.

Indicated national activities included in the Program for the Coal Mining Industry are part of the concept of a circular economy. However, it should be pointed out that the work upon the abovementioned projects has not yet begun.

The initiative undertaken by the EC to create guidelines for the best applied practices in mining waste management is in line with the objectives of the circular economy. It should be noted that the publication of the

abovementioned guidelines may contribute to increasing the use of raw materials from waste as an alternative to raw materials obtained from primary resources. Poland takes active part in the above initiative.

At the EU level, during meeting of the Working Group on the Environment on October 3, 2017 in Brussels, Poland declared its support in the activities listed in the Commission's report on the review of the implementation of EMAS (EU Eco-Management and Audit Scheme) aimed at improving the added value of EMAS. Particularly important will be activities such as:

- creating, in cooperation with the Member States, new opportunities to use EMAS as a tool to reduce administrative burdens by applying regulatory waivers;

- preparation of activity directions of aimed at building a system of legislative and financial solutions supporting the implementation of the eco-management and audit system (EMAS) in organizations;

- ensuring the effective reporting channels between organizations and public authorities, so that the environmental performance and compliance, as confirmed in EMAS, can facilitate the implementation of other environmental policies;

- activities aimed at popularizing EMAS as an effective tool supporting the transition to the circular economy model;

- building a system of legislative and financial solutions supporting the implementation of the eco-management and audit system (EMAS) in organizations.

At present, the ETV pilot program (verification of environmental technologies) is being evaluated, in which Poland takes an active part. Poland assesses ETV as a very good tool supporting the implementation of eco-innovation, the only one in the world, the procedures of which have been standardized. Poland is of the opinion that the program should be continued as a full voluntary program at the EU level. Countries interested in establishing the national ETV programs or already having such programs should work together with the EC to coordinate these programs with the EU program, especially in the area of the publication of verification certificates. Regardless of the above, after the adoption of ISO 14034 as the national standard, the Ministry of National Economy will consider creating a national ETV program covering a wider technological scope than the pilot EC (including environmental technologies in agriculture or monitoring and soil cleaning).

**Consumption.** Directive 2005/29/EC does not provide for specific rules on unfair practices related to environmental protection, ecology. However, it provides a legal basis to ensure that entrepreneurs will not use unfair practices towards consumers. An unfair practice can be, for example, the entrepreneur stating that the product he offers has specific features

desirable from the point of view of environmental protection - in other words – it is organic, while in fact it does not have such characteristics. Such practice may mislead the consumer and is therefore prohibited. On the other hand, the Directive may «encourage» entrepreneurs to invest in the environmental performance of their products. It enables them to provide consumers with honest information about their products. Poland actively participated in the preparation of new EC guidelines on unfair practices.

The EU Ecolabel scheme established by EU regulation 66/2010 provides added value in the context of circular economy and EU policies for sustainable consumption and production. The following should be considered important:

- dissemination of knowledge about certain product groups by means of their promotion at trade fairs devoted to ecological issues,
- raising the ecological awareness through the publication of articles devoted to the EU eco-labeling program and selected groups of products and services,

In the case of establishing a method for labeling the environmental footprint of products for measuring and transmitting the information on the environment, Poland recognizes the risks associated with the dissemination of methodology for functioning of a single market due to the adopted method of environmental assessment in the scope of modeling electricity. Studies performed by IGSMiE PAN convince that if the same technologies are used by enterprises in different countries, their environmental assessment may be radically different due to the type of electricity used. Poland is against the application of methodology for comparative purposes between products manufactured in different EU countries when using national data on the energy mix. Poland proposes that the assessment should take into account only those elements, on which the producer has an influence (so-called direct factors). We also disagree with the thesis that entrepreneurs have an unlimited choice of electricity (taking into account its origin – coal, atom, renewable sources, etc.). In the case of copper and batteries, Poland abstained from voting (the EC partly took into account Poland's concerns, but there is still a threat associated with modeling of electricity, and it is still unclear what specific EC regulations will be created based on methodologies). In the case of feed, Poland voted in favor of the methodology.

In the opinion of Polish specialists, the circular economy has an increasing impact on technological innovation, energy mix or recycling. In the opinion of representatives of the Ministry of the Environment, transition to a circular economy is a major challenge in waste management for the coming years for the effective use of raw materials, including improving the potential of waste generated in terms of their recycling and preparation for the re-use. Representatives of the Ministry of Enterprise and Technology point to the real need for waste education among the public from an early



age as part of the existing education system. In turn, representatives of local government units point to the positive fact of implementing the assumptions of circular economy at the municipal level [28].

Smart specialization strategy is assumptions and directions in the context of circular economy. The smart specialization strategy is active entrepreneurial bottom-up discovery of new innovative sub-sectors of the regional economy, assessment of their potential and support of their development [29]. The identification and selection of smart specializations are of crucial importance in the strategy generation process, because they have a decisive impact on the manner of their implementation and efficiency of the resources use at the disposal of a given region, including funds from the European Union.

The term «smart specialization» means de facto a new generation of research and innovation policy that goes beyond classical investments in research and development (R&D) and general creation of innovation potential. It involves creating a vision of identifying the competitive advantage, setting strategic priorities and optimizing the discounting of resources defined within individual policies in order to maximize the knowledge-based degree (stage) of development of each region. The most important factor in the process of building the innovation strategies using smart specialization is entrepreneurial discovery of niches, in which the region may have an advantage in terms of research and innovation.

Strategy of smart specialization distinguishes from typical innovation strategies not only due to broadly understood material and non-material resources, but also includes research problems and qualifications issues, including in particular geographical distribution, population structure in the region, size and structure of demand, level of innovation achieved, and degree of waste management.

This approach to the smart specialization strategy is consistent and is an important element of the «circular economy» model. The implementation of this model aims to improve the level of innovativeness of enterprises operating on a regional and local scale in particular, and to increase their competitiveness in relation to entities in other regions. Implementation of the principles of circular economy requires enterprises to create new business models. In the *Roadmap...*, definition of the circular economy business model is the sum of resources and activities that simultaneously serve 1) providing values to the client and 2) «closing the circulation» [30]. In order to motivate entrepreneurs to participate in the process of closing the circulation, the following proposals for public administration activities were presented on a national scale [31]:

➤ Comprehensive analysis of the possibilities of introducing changes in the tax system, which would allow increasing the competitiveness of enterprises operating on the basis of circular economy business models. The effect of the above analysis should be regulatory changes that clearly indicate the financial viability of business activities, such as: re-use,

repair services, sharing (movables, real estate, production tools and transport), lending, value-added products (MF);

➤ Analysis of the possibility of introducing reporting and control allowances for entities applying environmental standards (e.g. EU Ecolabel, EMAS, ISO, etc.) (MŚ);

➤ Introducing changes to the public procurement law that would generate demand for products and services created as part of circular economy business models (UZP);

➤ Development of a systemic support tool for enterprises operating on the basis of circular economy business models, including elements of their financing, education and promotion (Green Inn project) (MPiT);

➤ Legislative changes aimed at the legal regulation of sharing the real estate and movable property, in particular with regard to the regular short-term rental of free housing and passenger transport (MPiT in cooperation with MF);

➤ Developing the concept of creating a nationwide multi-industry online platform enabling products to be rented and sharing products with low frequency of use (MPiT).

The essential elements of smart specialization strategy are: discounting general and especially specific resources of the region, building a competitive advantage through diversification based on a unique knowledge localized in the region and new combinations in the form of innovations based on local assets, as well as in cooperation with complementary entities from other regions.

The choice of specialization should be based on both quantitative and qualitative criteria. The main criteria for the selection of industries, sectors are [32]:

- key resources and capabilities (e.g. specialized workforce), especially their original combination (cross-sectoral);
- the diversification potential of these industries, sectors resulting from their cross-sectoral links and between knowledge fields;
- critical mass / critical potential in a given sector;
- international position of the region in global value chains in a given specialization.

Theories and research confirm the existence of benefits from specialization, based on local resources and inter-sectoral connections in the innovation process. They are indicated in many theories and concepts, among others in: innovative environment, innovative systems, new economic geography (NEG), or a learning region. They emphasize that the innovation of regions depends on local learning processes determined by the scope and quality of information, intensity of interaction, as well as long-term development trajectories and investments, especially in human capital and knowledge tailored to the region's innovation profile. Learning processes are localized and based on previous experience, because they are

closely related to human capital, interpersonal relationships networks, specialized labor markets and local management systems. The smart specialization strategy is based on theoretical results and is implemented into the economic practice, and its achievements depend on the effectiveness of their practical applications [33].

Undoubtedly, the emergence of these benefits will depend on the possibility of indicating, the possibility of supplementing the smart specializations – innovative niches – by the region. In Poland, examples of specific niches, namely for the Lubelskie and Podkarpackie province, can be given. The following smart specializations were selected in the Lublin province:

- key specializations: bio-economy (primary production, bio-resources processing, food production – agro-food, chemical, paper, furniture, cosmetics, pharmaceutical, energy sectors);

- supplementary specializations: mechanical and health care services (nutrition and dietetics, functional foods, chain of medical and biomedical products, food production chain, production of pharmaceuticals and probiotics);

- supporting specializations: IT and automation (computers, software, telecommunication services, internet services, machines and electrical devices, robotics);

- emerging specializations: low-emission energy (energy from RES, energy from fossil fuels, clean gas and coal technologies, CO<sub>2</sub> capture and storage, biofuel and biogas installations, hydrogen and fuel cells).

Whereas in the Podkarpackie province, the following smart specializations were indicated:

- key specializations: aviation and cosmonautics, quality of life (production and processing of the highest quality biological and health food, ecological and sustainable agriculture and processing, regional and traditional products, sustainable responsible tourism, health (clinics, sanatoriums, senior homes), eco-technology, renewable energy sources (dispersed energy, wind turbines, water turbines, solar panels, biomass boilers, geothermal energy, etc.), energy-efficient construction (passive, zero energy and plus energy houses, etc.), intelligent buildings;

- supporting specializations: IT and telecommunication, areas of activity that require intelligent support: mobility, climate and energy, sustainable tourism, health, food, nutrition, ICT [34].

Summing up, the future of selected voivodships (Lublin and Podkarpackie) and the entire economy is determined by the scope and intensity of the use of smart specializations and consistent implementation of the assumptions of circular economy model.

**Conclusion.** At the end of 2015, the European Commission adopted solutions that in the next years will «close the circulation» of the European

economy, while ensuring development of a sustainable, low-emission, resource-efficient and competitive economy.

The assumptions and objectives for the circular economy set by the European Commission and the European Parliament are expected to bring potential effect the European Union by 2030 – i.e. savings of 8 % of the annual turnover of enterprises operating in the EU, increase in employment in the waste management sector by 170,000 positions up to 2035, increase in competitiveness, acceleration of economic growth and innovation, securing the supply of raw materials and improving the natural environment (for example, in the area of the reuse and recycling of municipal waste, Member States have agreed to process 55 % of municipal waste by 2025, 60 % – by 2030, and 65 % – by 2035). The achievement of the expected results will require many efforts and activities not only in the regulatory, institutional, financial and educational areas, but also in the mentality sphere of the business world and the politics of each EU member state.

Furthermore, in order to implement (effectively) the circular economy, reliable information, data and adequate methodology for measuring the circular economy are necessary – works in this area are realized. For only two years, Poland has been preparing to create a circular economy. Currently, Poland is at the stage of constituting the final approach to the process of implementing the circular economy's assumptions in practice – inter alia in the field of waste management policy or producer responsibility for the full product life cycle. This is a complex process, because the circular economy is a very wide issue, covering many areas of social life and industries. Hence, the real economic, social and environmental effects of the circular economy and economic policy in this regard for enterprises and the economy will be visible only for a certain period of time.

Referring to the main purpose of the research, it should be pointed out that the review of literature for the European, national and regional level, highlighted the assumptions of circular economy and its potential consequences for competitiveness and long-term development of Polish economy. In addition, it presented challenges in this area for public administration and enterprises operating at regional and local level. In the course of research, it was recognized that the concept of smart specialization strategy implemented for years is an extremely important tool for intensifying and guaranteeing the achievement of circular economy assumptions.

In conclusion, it should be said that the circular economy is currently one of the most important solutions and challenges in building a competitive advantage and Europe and its individual economies. The methodology, adopted in the study, allowed (at this stage) for the preliminary analysis of the objectives and potential effects of the circular economy' concept for the EU economy and its member states.

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**Шлюсарчик Б., Лехвар М. Циркулярна економіка Польщі.**

**Постановка проблеми.** Європейська Комісія в документі "Закриття циркуляції – План дій ЄС з циркулярної економіки" у 2015 р. запропонувала всім державам-членам Європейського Союзу перейти від моделі лінійної економіки до економіки замкненого циклу, в якій продукти, матеріали та сировина залишаються у виробничому процесі якомога довше, а обсяг відходів має бути зведений до мінімуму, що дасть змогу уникнути непоправної шкоди від ірраціонального використання природних ресурсів та підвищити конкурентоспроможність і довгостроковий розвиток європейської економіки. Виснаження сировинних ресурсів, підвищення їх вартості та зростаюча залежність від постачальників з інших країн становлять серйозну загрозу економічному розвитку європейських країн та актуалізують для науковців проблеми комплексного підходу дослідження організації виробничих процесів.

**Аналіз останніх досліджень і публікацій** щодо проблем циркулярної економіки свідчить, що питання вивчається в частині зменшення деградації довкілля, скорочення виробничих відходів, оптимального використання сировинних

ресурсів, підвищення енергетичної безпеки, економії для бізнесу, а також збільшення робочих місць.

**Мета** дослідження – визначення сутності економіки замкненого циклу та її потенційні можливості для підвищення конкурентоспроможності європейських і польських виробників шляхом аналізу проблем, з якими стикаються центральна та регіональна влада.

**Матеріали та методи.** У дослідженні використано метод аналізу документального матеріалу для визначення реальної картини конкретних подій, фактів та досягнень, надання найбільш важливої інформації.

**Результати дослідження.** Розглянуто необхідність оновлення стратегії промислової політики європейських країн, що поєднує існуючі та нові горизонтальні й галузеві ініціативи у комплексі. Зосереджено увагу на національних та регіональних особливостях Польщі, що застосовує циркулярну економіку, систему екологічного менеджменту та аудиту, пілотну програму перевірки екологічних технологій. Виокремлено термін «розумна спеціалізація», яким позначено нову дослідницьку та інноваційну політику, що вмотивовує підприємців брати участь у закритті виробничих циклів на національному рівні. Обґрунтовано необхідність впровадження змін у податковій системі Польщі, державних закупівлях, фінансуванні, освіті.

**Висновки.** Наприкінці 2015 р. Європейська Комісія ухвалила рішення, спрямовані на формування найближчими роками європейської економіки закритого циклу, одночасно забезпечуючи її розвиток як сталої, екологічної та конкурентоспроможної. Очікується, що це підвищить конкурентоспроможність підприємств, прискорить їх економічне зростання, забезпечить постачання сировини та поліпшить природне середовище. Досягнення очікуваних результатів вимагатиме значних зусиль не лише в регуляторній, інституційній, фінансовій та освітній галузях, а також перетворень у ментальності ділового світу та політичних якостях кожної держави-члена ЄС. Лише два роки Польща готувалася до створення такого типу економіки і наразі перебуває на стадії формування остаточного підходу до впровадження її умов на практиці. Це складний процес, оскільки циркулярна економіка охоплює багато сфер суспільного життя та виробництва. Отже, оцінити реальні економічні, соціальні та екологічні наслідки її розбудови можна лише за певний період часу.

**Ключові слова:** циркулярна економіка, екологічні технології, розумна спеціалізація, конкурентоспроможність підприємств, сталий розвиток, система екологічного менеджменту та аудиту.