

Agnieszka Karman

The Review of Policy Instruments Stimulating Circular Economy: A Case Study of Poland*

Przegląd instrumentów politycznych stymulujących gospodarkę cyrkulacyjną:
analiza przypadku Polski

Introduction

Europe's dependence upon the import of natural resources results in the search for new means to decrease the use of materials and extend their circulation for the longest possible duration. If the EU seeks to prove credible about reducing its environmental footprint associated with resource consumption, the extension of products' life cycles has to become a key component of any relevant political strategy. Even though several initiatives aimed at transforming Europe into a "recycling society" have been introduced, such as the European Commission's Circular Economy Package (European Commission, 2015b) or the Ellen MacArthur Foundation's CE 100 initiative (EMF, 2015), the reality is far from expectations. The transition to an economic model in which resources are produced in an efficient manner, used in an appropriate fashion, re-used, re-manufactured and recycled has not materialized so far. The transition bears certain expectations in the social domain- retention of jobs and the quality of life. The large number of challenges raises substantial complications for policy-makers. The response to these is a policy mix combining numerous policy instruments, including climate policy (IEA, 2011), environmental policy (Ring

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& Schröter-Schlaack, 2011) and innovation policy (Flanagan et al., 2011). Following Rogge and Reichardt (2013, 2016), the authors of this article argue that policy instruments have become specific mechanisms to achieve overarching goals. Specifically, the instruments can be viewed as mechanisms or techniques of governance addressing policy problems.

At the strategic EU level, the transition to circular economy (CE) was outlined in the framework of the resolution of 9 July 2015–2014/2208 (INI). The resolution acknowledged the significance of a prudent policy which increases the expected lifetime, durability, reusability and recyclability of products. The resolution stresses that instruments supporting the introduction of such a policy must include diverse mechanisms and actions at all levels to generate a comprehensive policy mix which has the potential to alter the fundamental principles of the current economic model. Such an approach to the policy has resulted in a considerable evolution of the CE concept over the past decade. Initial actions aimed at raising awareness have been transformed into plans and specific programs. International organizations have produced a plethora of reports, guides and frameworks that provide assistance in the transition to CE. Despite a broader in-principle backing for the transition, most studies and reviews find that the uptake is slow (Adams et al., 2017; Masi et al., 2018). The circularity of global economy is merely at nine percent (with Europe at twelve percent, and China at two percent). The linear model dominates (Circle Economy, 2019, p. 8). Such inertia encourages the examination of the issue in order to improve the understanding of policies supporting CE development, especially economic instruments that are capable of fostering the transition from linear economy.

This article aims to provide a review of policy instruments pertaining to CE in EU member states and to facilitate the understanding of the instruments' structure and purpose. By the application of an analytical framework founded upon economic studies, this article pinpoints and analyzes key governing resources that governments exploit to execute the CE policy. Specific instruments are discussed for each category. The practical application of the instruments was discussed based on the example of Poland, which is a leader in waste management among the V4 (Zgut et al., 2018), especially in terms of policies (Zaleski & Chawla, 2020). An additional objective of the article was to track Poland's progress towards CE as a result of the impact of policy instruments fostering CE development the country introduced in the past few years. This serves as a rationale for indicating potential instruments for improvement.

The article was structured as follows: the rationale for CE policies is summarized in Section 2. Section 3 outlines the research method, while Section 4

discusses individual categories of policy instruments dedicated to CE. Section 5 analyzes policy instruments recently introduced in Poland to stimulate the country's transition to CE. Section 6 draws conclusions.

1. Rationale for CE policies

CE principles emerge from the intent to overcome disadvantages and limitations of the linear economy model that seems to disregard the environmental impact of economic activities. Natural resources and waste are respectively considered free input and output to the economic system in the linear economy. The products' life cycle encompassing the following sequence: natural resources – production – consumption – waste, leads, on the one hand, to the depletion of natural resources, and increases waste volume on the other. In the linear model, the resources constitute a resource base for production and consumption processes. This results in the negative consequences for resource extraction: from 1970 to 2010, the annual global extraction of materials tripled, growing from 22 billion to 70 billion tons, inter alia, propelled by the swift growth of emerging economies such as India and China (Ekins & Hughes, 2017). In Europe, where resource consumption actions were popularized, the domestic material consumption index (encompassing fossil energy materials/carriers, non-metallic minerals, metal ores and biomass) peaked in 2007 with over 17.2 tons per capita and has slightly declined since then to around 13.3 tons per capita in 2020. The issue of waste generated during the extraction, production and consumption processes constitutes another problem. For example, in the EU, its volume has been growing steadily since 2004 to reach a maximum in 2018 (2,168,860,000 tons). A certain volume of waste is processed. However, following the principles of thermodynamics, it does not disappear but is transformed into other forms. The focus should be to ensure that the forms possess a certain economic value.

As a consequence, questions concerning the responsibility of economy for the negative impact have been raised. This is associated with a moral commitment to an attitude change or amelioration of any damage. Such a commitment, associated with a high level of environmental awareness, should lead to positive moral-driven decisions, and consequently, to desirable environment-friendly behavior. The insufficient impact of this instrument has drawn the policy-makers' attention to other potential incentives. Therefore, CE policy has been founded upon the premise that the market disposes of a limited scope of incentives to

block environmental threats. Therefore, governments must intervene and strive to improve the situation (Maitre-Ekern, 2017).

The CE concept surfaced in Europe in the 1990s, drawing on ideas that can be traced back to the 1970s (Stahel & Reday, 1977). The circular economy highlights the regenerative function of the ecosystem, minimizing the depletion of non-renewable resources, extending the useful life of products, and reusing all materials entering the economic cycle with the objective of minimizing waste and emissions (Geissdoerfer et al., 2017; Korhonen et al., 2018; Reike et al., 2018). According to Vence and Pereira (2019, p. 3), “the specific objective of the circular economy is to reduce the consumption of resources and energy and reduce waste through the perpetual return of resources within the economy. All resources incorporated into the economic cycle must be managed as permanent and renewable resources”. The political framework which the CE concept was based upon was outlined in the flagship initiative titled *Closing the Loop: An Action Plan for the Circular Economy* (European Commission, 2015a). As already mentioned, initially, policy instruments focused primarily upon eliminating waste and upon waste treatment (Saavedra et al., 2018; Hauschild et al., 2017). Another topic which was developed was sustainable public procurement (SPP) practices (Wang et al., 2018; Adjei-Bamfo et al., 2019). Multiple perspectives, including surveys and comparisons of practices, were employed in order to explore these subjects. The issue of CE policies was raised to a lesser extent; most studies are case- or industry-specific. Following Hartley et al. (2020), studies concerning CE policies focused on quality standards (Nusholz et al., 2019), public procurement (Witjes & Lozano, 2016), market mechanisms (Cruz-Pastrana & Franco-Garcia, 2019), education, promotion (Bicket & Vanner, 2016), infrastructure (Silva et al., 2019), financial incentives (Geng et al., 2009), and labelling remanufactured products (Gavertsson et al., 2018). Other types of policy instruments have been loosely integrated into academic studies. We believe that the examination and understanding of policy instruments will contribute to the expansion of available mechanisms supporting CE development.

Policy instruments can be classified based upon diverse criteria. Landry and Varone (2005) propose to categorize these according to the following: 1) resource intensiveness, characterized in terms of operating costs; 2) targeting, viewed in terms of how precisely and selectively policy instruments address recipients of benefits and costs; 3) political risk, characterized in terms of public visibility and potential impacts on voters; and 4) constraints on state intervention, specified in terms of ideological and financial constraints. Schneider and Ingram (1990) base their considerations upon motives, settling on five key categories of tools:

authority, incentives, capacity building, symbolic (hortatory) tools, and learning tools. Such criteria enable an analytical characterization and comparison of policy instruments. The classification adopted in the present article is discussed in the next section.

2. Research method

A review was undertaken to identify policy instruments that stimulate the transition to the circular economy. The research questions to be considered in the review included the following:

1. What policy instruments are available that stimulate the transition to the circular economy?
2. What are the properties of the identified instruments?
3. What were the applications of these instruments in Poland in the past 5 years?
4. Which instrument is the most appropriate to stimulate the transition to CE?

Based on these key questions, a list of inclusion criteria was developed, including search terms: politics, policy instruments, mechanisms in connection with circular economy. Limiters included English language and publication after 2015.

The review of policy instruments pertaining to CE was based on a comprehensive analysis of the following: 1) research articles and empirical surveys in Science Direct database; 2) online documents in which the policy development is examined and discussed (EEA, 2016a, 2016b). We used analytical frameworks for systemic literature research. The majority of articles were found by means of the first query approach. As a result of this search, 45 articles were filtered. To cover possible outflows of relevant articles, a manual search was deployed using the search term “circular economy”. In the circular economy, the following keywords were used: “transition”, “implementation”, “tools of government” and “policy instrument”, “policy” to be found in summaries. Keywords such as regulation, economic instruments, authority, tax, subsidy, were also included in the manual collection. Lastly, an Internet search was made that mainly resulted in duplications of research articles. Additionally, government policy papers (strategies, programs) and reports were located. In total, 60 papers were included for scope formation.

A comprehensive approach was adopted in the identification process. It included policy instruments regardless of whether they constitute an instrument of separate initiatives or are an element of comprehensive programs. The NATO classification scheme was employed in the instruments’ classification (Hood,

1983). It splits policy instruments into four salient governing resources: Nodality, Authority, Treasure, and Organization-based. The first category of instruments concerns the provision of information. From its specific position in society, the government has the advantage of being “a store of information”; hence, the government can use the information to reach its policy objectives. The second category is instruments of authority. They are intended to command and to forbid, to commend and to permit (Vught & de Boer, 2015). Instruments of authority vary depending on the degree of restriction they seek to introduce into the behaviour of the targeted subjects. The third category of policy instruments concerns the power of treasure. Treasure is what enables governments to buy favours, to court popularity, to hire mercenaries and the most popular instruments in this category are contracts and bounties. The fourth category is organization. All kinds of operational government activity directly influencing citizens fall within this category.

An in-depth case-study-based analysis of a selected country is featured further in the article. The case study aimed to analyze Poland’s performance in the aspect of the circular economy regarding policy instruments pertaining to the CE concept the country introduced. The assessment of policy effectiveness serves: 1) to showcase policies and governance approaches that have demonstrated an impact; 2) to identify needs for further policy instruments. The analysis builds on quantification of policy effectiveness (i.e. indication of how much/how often instruments do have an effect) as much as possible. The gold standard to evaluate and quantify the effectiveness of policy instruments is the comparison of empirical observations (performance) with theoretical assumptions (targets) (Klaus et al., 2019). Theory-based evaluation uses an explicit theory of change throughout the causal chain from policy outputs to outcomes and final impacts. Data for the analysis were extracted from Eurostat and government papers and reports available online.

3. Analysis of CE policy instruments

NATO classification (presented in Section 3) offers a good overview of the tool kit a government has at its disposal in transition to Circular Economy. Based on this categorization, in the following section, we will discuss the approach and the various categories of policy instrument applied by European Commission in implementing the concept of CE.

3.1. Nodality

The nodality of the instruments pivots on the belief that the transition to CE depends upon the level of CE knowledge and information about its effectiveness.

The instruments act in the following manner:

- improve the social understanding of CE;
- support research and development of transition options;
- aggregate and analyze data concerning sub-aspects of CE;
- indicate valid indicators for monitoring and evaluating.

Knowledge-sharing tools encompass virtual collaboration spaces such as databases, discussion forums, electronic documentation, and training modules (Hammill et al., 2013). Transfer of knowledge primarily targets the change of product users' behaviors. In the course of product purchasing, information about the price, content and origin may be disclosed. In the CE context, eco-labelling performs a vital product information role. It provides information concerning reparability or recyclability. The requirement for applying eco-labelling is outlined in, inter alia, Eco-design and Energy Labelling Directives, Article 15 the WEEE (Waste Electrical and Electronic Equipment) Directive and Article 33 of the REACH (Registration, Evaluation, Authorization and Restriction of Chemicals) Regulation. For example, the Energy labelling scheme, established by Directive 2010/30/EU, seeks to provide consumers with information regarding the consumption of energy and other resources by energy-related products. Eco-labelling regarding energy consumption enables clients to make conscious decisions regarding products with higher or lower energy performance. Eco-labelling in terms of resource efficiency or a QR code directing to a more detailed online product information constitute a further step promoting CE eco-labelling.

3.2. Authority

Authority instruments exploit the capacity of a country to order/ban certain actions. The fear of penalization or an obligation to follow the law provide the motivation behind the actions. Legislation constitutes the fundamental authority instrument. Legal regulations serve various CE objectives, including allocation of responsibilities, provision of legal authority for decision-making, definition of liabilities, and validation of other instruments (Dovers & Hezri, 2010). The literature of the subject emphasizes a well-developed legislation pertaining to waste management (Bhave & Sadhwani, 2016; Patil & Ramakrishna, 2020). In its foundation, waste management combines the following: the polluter pays

principle (PPP), the principle of extended producer responsibility (EPR), and the waste hierarchy and life-cycle thinking to inform policy action in the field of waste management and beyond (i.e. waste prevention). The freshly introduced regulations contribute to the change of optics concerning waste: from perceiving waste as useless to viewing it as a resource. Although the condition of waste management is improving in the EU, the economy is currently losing a considerable volume of potential secondary raw material originating from the waste stream. As a consequence, targets constitute a policy instrument which supplements waste legislation. Pursuant to Article 29 of the WFD, Member States are bound to develop waste prevention programs, including the establishment of target quotas in recycling or recovery. Among waste management programs already in place, merely half of them established the quotas (EEA, 2015). The introduction of mandatory recycling quotas enabled an improved direct controlling of the use of secondary raw materials and mechanical recycling. Targets concerning waste recycling with a 2030 horizon are recommended – 70% for municipal waste and 80% for packaging waste. Based on the objectives of the 7th EAP, the European Commission (2014) outlined a proposal encompassing recycling and preparing for the re-use of packaging waste increase to 80% by 2030. Material-specific targets will increase incrementally between 2020 and 2030 to reach 90% for paper and cardboard by the end of 2025, and 60% for plastics, 80% for wood, 90% for ferrous metals, aluminum and glass by the end of 2030. The Commission also recommended the use of economic instruments to be improved, thus economically incentivizing people to recycle more.

In terms of instrumentation, the Eco-design Directive is an important piece of legislation. The directive aims to advance products' design so that their durability and ease of repair are enhanced. This enables resources to be conserved due to easier disassembly. Due to the fact that more than 80% of all impacts related to products are determined in the design phase (Tischner et al., 2000), the directive aims at the overall enhancement of environmental performance from a lifecycle perspective. Additionally, the Eco-design Directive establishes mandatory energy performance standards (MEPS) which need to be met by all products placed on the single market. In the CE context, this facilitates the improvement of resources and energy performance.

Authority instruments also include market-based regulations. These are formed as an alternative to command-and-control regulations so that flexibility to economic agents is provided to achieve an environmental objective. This approach is mirrored in the Extended Producer Responsibility (EPR). The policy extends the producer's responsibility for a product to the post-consumer stage

of a product's life cycle (OECD, 2001). This mechanism supports the collection, processing and recycling of specific products. This is to encourage producers to adopt responsibility for the whole product life cycle. As a policy instrument, the EPR strives to internalize environmental externalities. It is also viewed as a chief mechanism in line with resource efficiency (Monier et al., 2014). The EPR principle was introduced in the European Packaging Directive, Waste Electrical and Electronic Equipment (WEEE) Directive, ELV Directive and the Batteries Directive.

3.3. Treasure

Instruments in this category are primarily financial in character. An assumption is made that the transition to CE will exclusively occur if financial incentives and disincentives are introduced which will overcome the financial barrier or increase the cost of operation. Subsidies constitute an extremely stimulating instrument. In a CE policy framework, 75 favorable subsidies are employed in order to conquer financial barriers to the investments required for the increase of the recycling capacity and promotion of organizational and behavioral changes in production and consumption (Aranda-Usón et al., 2019). Subsidies supporting CE development are dedicated to individual groups of recipients or industries. As far as the energy sector is concerned, two groups of subsidies are of vital importance: incentives for RES-produced electricity, and promotion of energy efficiency and energy production from thermal RES. Even though the first mechanism raises no doubts, the effectiveness of the second one is uncertain due to contrasting effects on CE (Gargiulo et al., 2019). With regard to the transport sector, some subsidies were categorized as CE-consistent, mainly for the lower primary energy consumption allowed by vehicles. These subsidies constitute a contribution to the purchase of new, low CO₂ emission vehicles. Other types of CE-stimulating subsidies include green garden bonus, tax credit for the purchase of mixed plastics, company income tax credit for the purchase of recycled-plastics products, tax credit for biodegradable and compostable packaging. Most of these instruments share the following characteristic – the use of tax discounts in order to incentivize enterprises to undertake actions in the CE framework.

The second group of treasure instruments encompasses financial disincentives related to taxation. Tax policies play a key role in the CE transition as they can exert an impact upon relative prices. This constitutes an additional fiscal burden based on the concept of extra fiscality or extra fiscal taxation (Vence & Lopez Perez, 2021). This is not restricted to the acquisition of additional budgetary

revenue, but realizes additional social objectives. This way, it brings about far-fetched changes in production and consumption. A review of tax-related solutions pertaining to the circular economy indicated the following: CE puts a priority upon non-renewable resources taxes, thereby eradicating subsidization of polluting sectors and reducing or eliminating taxation of renewable resources (Ex²Tax Project, 2016, 2019). Taxes levied on non-renewable resources constitute an impulse to minimize resource consumption, by-products of production, and waste.

3.4. Organization-based

Organization-based instruments assume the delivery of services by government bodies or the development of conditions supporting economic entities in the transition to CE (Henstra, 2016). The first approach is a demonstration. CE policies propose the development of dedicated zones (provinces, cities) acting as a pilot and demonstration stage, the so-called eco-industrial parks (Zhao et al., 2021). The concept pivots on linking enterprises which share resources (Valenzuela-Venegas et al., 2016). This leads to the emergence of economic benefits, improvement of environmental quality and equitable boost of human resources for the business and local community (Popescu, 2008). Such locations connect producers by making shared infrastructure available and facilitating trade in waste. One product or a part of a manufactured component could become the resource or raw material for another one; this aims to lead to recycling by exchanging physical materials, energy, water, and by-products among a chain of companies. In the CE-transition context, eco-industrial parks perform a significant role in enhancing inter-firm connections for CE initiatives. They also serve as test venues (Park et al., 2019), enable up-scaling of successful pilots, and constitute circular trading platforms. The components of such an approach encompass the following: green design of park infrastructure, cleaner production, pollution prevention, resource efficiency, 3 Rs, inter-company partnering. Eco-industrial park initiatives in developed countries, such as Denmark, USA, Germany, and Japan, offered useful references for EIP development in developing countries, especially in China (Xing et al., 2017).

The second way for encompassing the inclusion of CE postulates into the operation of government administration is procurement. At present, the implementation of Green Public Procurement (GPP) instrument is voluntary. This means that public finance sector bodies can establish the extent to which they incorporate green procurement. The EU has so far only put an indicative 50% target in place,

and promotes the GPP in terms of energy criteria (Arditi & Wachholz, 2017). Circular procurement directs the GPP concept towards the purchase of works, goods or services that aim to support the closed energy and material loops within supply chains, while at the same time minimizing, and in the best case scenario, eliminating negative environmental impacts and waste generation across the whole life-cycle (European Commission, 2017). The GPP promotes products and services with a decreased material footprint or improved recycling options. This aim is fulfilled by including circular requirements into the selection criteria of bidders, technical specifications of product or contractual clauses. According to Alhola et al. (2017), public procurement can promote the principles of the circular economy in the course of the following:

- adding “circular criteria” to traditional products, i.e. criteria for recyclability, reuse of materials, use of recycled materials;
- purchasing new and innovative products which promote businesses based upon circular economy;
- exploiting new business concepts, i.e., shared use, buy-per-use and buying and selling back;
- promoting industrial symbiosis and circular ecosystems.

The present review indicates that situations linked to promoting the circular public procurement vary in different countries (Alhola & Salmenperä, 2019). At the state level, a number of actions have been taken in the Netherlands. On the other hand, Denmark, Sweden and Finland have been working towards sustainable procurement. Latvia and Poland have taken measures concerning green public procurements (f.e. Urząd Zamówień Publicznych, 2017). Recommendations have been made that countries assess options of making sustainable and circular public procurement more binding.

Figure 1 has been used to describe disadvantages and advantages of selected policy instruments presented above. Note, however, that the typology is not intended to be an exhaustive coverage of all possible policy instruments dedicated to circular economy; other instruments include e.g. voluntary agreements, treaties, international soft law (see also Bouwm et al., 2015; Ellen MacArthur Foundation, 2015). Due to specific geographic focus or looking at specific solutions they are rarely analyzed from an international governance perspective.

Figure 1. Disadvantages and advantages of policy instruments

Advantages Internationalization of negative external outcomes Recipient-attributable High effectiveness Low political risk	Disadvantages High costs in the case of certain instruments Necessity of admin work Issue of determining taxation level Social pressure to reduce taxation	Advantages Universality Direct impact High effectiveness	Disadvantages Susceptibility to political influence Necessity of control and monitoring Possibility of negative distributive and social effects Potential social resistance
		AUTHORITY	
TREASURE		Policy instruments dedicated to circular economy	NODALITY
ORGANIZATION-BASED			
		Advantages Direct impact Low political risk Demonstrative capacity	Disadvantages Admin costs Lack of specific CE criteria pertaining to public procurement
		Disadvantages Low effectiveness in terms of behavioral change	Advantages Low risk of political influence Target end recipients Low per-user cost

Source: own study.

4. Progress towards CE and the application of CE-stimulating policy instruments in Poland

In January 2018, the *Roadmap for Transformation Towards Circular Economy* (2019) was released for public consultation. The Roadmap is scheduled to deal with four chief strategic areas:

- sustainable industrial production,
- sustainable consumption,
- bio-economy,
- new business models.

The document was approved in September 2019 and offered a collection of tools aiming to develop conditions enabling the introduction of a new, CE-based economic model in Poland. The proposed actions pertain to analyses and conceptual works, information, promotion and coordinating initiatives.

Concerning nodality instruments, the Roadmap indicates that environmental education is critical for the successful CE transformation. According to the study by Stena Recycling,¹ the fundamental environment-friendly actions in Poland are popular. However, the awareness and familiarity of Poles concerning circular economy are low. Approximately three out of four respondents have never come across the term CE – over 40% have never heard about the term and 30% are not certain they are familiar with it. Among Poles who have heard about CE (29%), the majority associate the term with environmental matters: opportunity for reducing the number of dump sites and the volume of waste (57%), and a general improvement of the condition of the natural environment (49%). The fewest respondents mentioned CE in the context of new legal regulations (24%), environment-friendly design of products (28%) and CSR (29%). Such results confirm the need for the application of educational instruments in CE-awareness raising. Additionally, putting education on the track to changing consumer behavior by raising sustainable consumption awareness is also vital. Therefore, it seems positive that government policy papers suggest the application of nodality instruments, i.e. the government CE information platform, and public campaigns promoting models of sustainable consumption.

As far as eco-labelling is concerned, we believe that the number of EU Ecolabel products and EMAS-licensed organizations in a specific country is indicative of the extent to which the private sector and national stakeholders are engaged in the CE transition. Eco-labelling shows the commitment level of public authorities in relation to the support of CE. Poland has registered 3075 products in the EU Ecolabel scheme for the total of 78,071 registered in the EU.² The

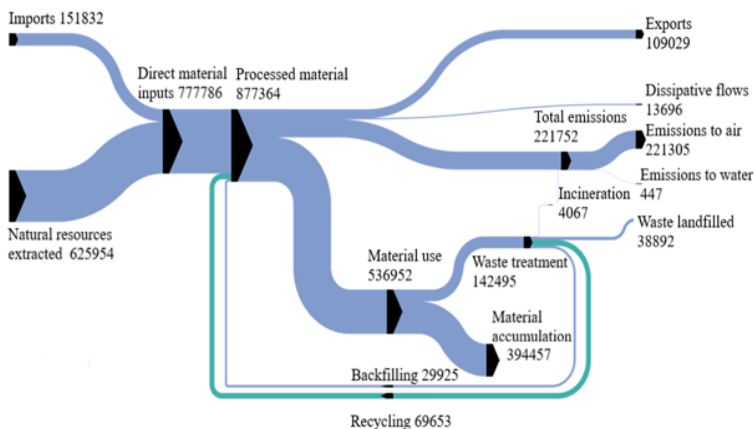
¹ The study was conducted between 4-5.07.2017 by SW RESEARCH agency by means of web interviews (CAWI) on the representative sample of 1004 Poles. *The state of knowledge on the circular economy in Poland (Stan wiedzy Polaków nt. gospodarki obiegu zamkniętego)*. Responsible Business Forum (Forum odpowiedzialnego biznesu). Retrieved from <https://odpowiedzialnybiznes.pl/publikacje/stan-wiedzy-polakow-nt-gospodarki-obiegu-zamknietego/> (28.03.2022).

² *EU Ecolabels key figures*. (2021). Retrieved from <https://ec.europa.eu/environment/ecolabel/facts-and-figures.html> (28.03.2022).

EMAS system features 69 organizations.³ This suggests further opportunities for exploiting this type of policy instrument. However, government support for such an activity is missing.

Authority instruments constitute the second group of policy instruments. They are primarily directed at reducing the volume of waste and ensuring recycling quotas are met. Thirty-four percent of every 336 kg of waste generated per capita in Poland are recycled. This denotes that landfilling predominates among waste treatment forms (43%; see also Figure 2). The present level is over 30% above the EU threshold for 2035 set at 10%. Since 2012, the volume of waste processed thermally has been growing dynamically. In 2018, three million tons of waste underwent the process, which corresponds to 24% of municipal waste. In line with the amendment of the Act on tidiness and order in municipalities (*Ustawa o utrzymaniu czystości i porządku w gminach*, 1996) which was based upon the requirements of the EU waste framework, local government units are obliged to recycle 50% of the collected municipal waste in the 2020–2024 period (in weight terms). The percentage is to increase by 5% every 5 years and amount to 65% in 2035. In 2018, the volume of waste recycled in Poland amounted to 34%. This suggests a risk of failure to meet the target set by the act.

Figure 2. Material flow diagrams for Poland (2019)



Source: Eurostat.

In order to boost the recycling level, the directive on packaging and packaging waste was amended in 2018. The amendment set out to increase recycling levels of packaging waste in 2025 up to 50% for plastic waste, 70% for glass and 75%

for paper, and in 2030 up to 55% for plastic waste, 75% for glass and 85% for paper. The analysis of effectiveness of the present municipal waste collection and management system is scheduled for 2021–2022. The analysis will include the demand for resources critical for the economy. Propositions of regulatory changes necessary for bringing the CE concept into life in terms of municipal waste will be put forward in the analysis.

As regards industrial waste, a slight decline was noted in 2020 (4%) in relation to the previous year. Industrial waste originated primarily from the following: mining (60.8 million tons), industrial processing (23.1 million tons) and electric energy, gas and water production and supply (11.6 million tons). Waste management methods primarily included recovery (48.4%) and landfilling (42.3%) (GUS, 2019). The growth of resource productivity and resource decoupling constitute positive trends observable since 2011. As far as industrial waste in Poland is concerned, primarily authority instruments are exploited. Changes proposed in the field are convergent with EU trends promoting the CE model. On the one hand, the changes strive to enhance the supervision over the market, and on the other, seek to increase the waste volume recycled in accordance with the targets delineated in the Waste Framework Directive (Dyrektywa Parlamentu Europejskiego i Rady (UE), 2018), plastics directive (Dyrektywa Parlamentu Europejskiego i Rady (UE), 2019), Strategy for Sustainable Development (Strategia na rzecz Odpowiedzialnego Rozwoju, 2017), and National Waste Management Plan up to 2022 (Krajowy Plan Gospodarki Odpadami, 2016). Experts draw attention to two aspects. The first is the necessity of supporting the development of thermal waste processing installations by simplifying administrative procedures, and boosting resources of the National Fund for Environmental Protection and Water Management (Narodowy Fundusz Ochrony Środowiska i Gospodarki Wodnej) assigned to loans (Odpady przemysłowe w Polsce, 2021). The second aspect concerns the amendment of the Penal Code and the Code of Petty Offence which increases the penalty for illegal waste handling. On the other hand, the Roadmap recommends the introduction of legislative changes to increase the reuse of coal combustion products (CCPs), and in subsequent years, the development of guidelines pertaining to the Zero Waste Coal Power.

As far as organization-based instruments are concerned, Waste and Recycled Materials Trade Platform (platforma Handlu Odpadami i Surowcami Wtórnymi) at the Warsaw Stock Exchange was announced to be established as early as 2018. The platform was intended to connect producers of waste with administrators of waste, brokers, local governments, and parties interested in acquiring recycled materials. So far, the development of a platform dedicated to waste remains

in the draft phase. Moreover, the widely discussed national multi-disciplinary online platform which is to enable products to be rented or products of low-use frequency to be shared has not been developed. On the other hand, the roll-out of a novel electronic database on waste which occurred in 2018 should be viewed as a positive development. All producers of WEEE, batteries and packaging are required to re-register for entry in the database. This should alleviate the issue connected with statistics, enhance the monitoring of the movement of the waste, and assist in curbing illegal activity.

Sustainable public procurement constitutes an example of the application of organization-based instruments. In Poland, circular public procurement has not risen to the national policy level as an objective. However, sustainable public procurement will be incorporated into the upcoming national procurement policy. The fourth national action plan on sustainable public procurement was adopted on 7 April 2017. It embraced a target of 25% of green procurement up to 2025 without the prescriptive form. The Public Procurement Office promotes voluntary application. A European Parliament study reported that Poland introduced the national action plan for green public procurement merely in part (European Parliament, 2017), which resonates in studies conducted by the Public Procurement Office (2018). In 2017, 344 ordering parties (among 33,690) reported that they completed 1212 public procurement procedures which included environmental aspects. This constituted 1% of the total number of the procedures. Environmental aspects were most frequently outlined in the description of works under contract, pursuant to Article 29, Item 4, and Article 30a of the Public Procurement Act (*Prawo zamówień publicznych*, 2019), as well as in the evaluation of bids, where the following were prioritized: 1) higher resource efficiency, and 2) use of recycled or recyclable products. In order to promote sustainable public procurement, the Public Procurement Act was amended in 2019, and between 2010 and 2020, the National Action Plan in terms of sustainable public procurement was developed. Such actions contributed to the popularization of this policy instrument. At present, the inclusion of environmental aspects in the framework of public procurement procedures constitutes a “hot topic” in the debate on public procurement. The Public Procurement Office continues with the promotion of such solutions.

Treasure instruments constitute the final group of instruments. Following recommendations for Poland in 2017 (in the framework of the Environmental Implementation Review for Poland), certain positive changes occurred. The National Fund for Environmental Protection and Water Management, under the Sustainable Waste Management program (Information of the Minister of the Environment, 2019), grants financial assistance to actions aiming at the modern-

ization of local heat sources in the context of waste incineration. This constitutes a positive and prominent step forward towards CE. The landfill fee has been reformed. It increases rates progressively and discourages disposal of municipal waste, including separately collected waste and waste suitable for energy recovery. Principles concerning separate collection were also standardized at the national level. They incorporate a new obligation to collect biodegradable waste separately (EU Environmental Implementation Review, 2019). However, much remains to be done. Experts suggest the introduction of incineration fees to be considered in order to divert waste towards the higher end of waste hierarchy more effectively, and to make recycling and reuse economically attractive (Konsultacje KPO, 2021). Another option postulated in the Roadmap is the amendment of the tax system. This would enable the boost of competitiveness of businesses operating based on the CE business model. Such an approach entails the development of incentives for enterprises dealing with recycling and recovery of resources critical for the economy, reuse of products, sharing, etc. Additionally, the introduction of subsidies for R&D in CE is proposed. Tax exemptions may become a separate tool, with a potentially more extensive scope of impact. They may entail the reduction of the tax burden if an entrepreneur meets certain requirements, e.g. certain volume of recycled materials used in the production process or reduced volume of waste the company produces. Solutions linked with tax exemptions may be introduced in Poland on a broader scale in the framework of the act on extended producer responsibility (PARP, 2021).

Conclusions

The current EU policy in support of the CE transition exploits a variety of policy instruments. The fundamental objective of the present article was to review and classify the instruments. The review confirmed that the policy in place is neither completed nor perfect. However, it offers a bulk of crucial instruments. The additional objective of the article was to analyze policy instruments introduced in Poland within the previous five years in support of the transition to CE, and to determine the viability of the expansion of the instrument pool. Such an analytical framework should improve our grasp of policy-mix effects. As a consequence, more precise recommendations can be developed.

Four groups of mechanisms have been distinguished in the course of the study: nodality (e.g., info meetings, social campaigns, eco-labelling), authority (e.g., targets, direct legal regulations, eco-design, Extended Producer Respon-

sibility), treasure (e.g., subsidies, taxation), organization-based (e.g., demonstration, eco-industrial parks, green/circular public procurement). Legal regulations constitute the fundamental group of policy instruments. Even though a lack of applicable legal acts was not identified, their dispersion and lack of adaptation to the present reality are troublesome. Moreover, legal issues may be regarded as one of the most effective stimuli for introducing CE solutions. When referring to this group of policy instruments in the Polish context, experts recommend extended producer responsibility systems to be developed in order to encompass the largest group of waste fractions (Jarzabek et al., 2020). The recommended changes also pertain to the continuation of efforts to improve the enforcement of waste legislation; in particular, to launch effective penalties, and to guarantee more effort is devoted to eradicating illegal waste dumping. Economic mechanisms constitute another vital part of the policy. For treasure instruments, the introduction of incineration fees is postulated so that waste is diverted towards the higher end of the waste hierarchy more effectively, and recycling and reuse is made economically attractive. The remaining two groups of policy instruments in Poland are voluntary. They pertain to the provision of information to downstream users and end-consumers as regards the disassembly of components and properties of embedded materials, development of conditions for experimenting with circular business models, and support of circular public procurement. As far as these instruments are concerned, it may be argued that both at the central and local levels, informative actions addressing circular economy are rarely undertaken. What is missing are information campaigns pertaining to the prevention of waste generation, which are a prominent feature in the waste management hierarchy. Another field in need of urgent improvement is reporting. This is reflected in the report by the Supreme Audit Office (NIK, 2019). It indicates that the data reporting system does not enable the volume of plastic waste to be determined and its full and final management method to be identified. The identified gaps confirm that nodality instruments are employed in an insufficient manner, which, in the opinion of the authors, may hamper the introduction of circular economy in Poland.

Polish CE policy faces several challenges. The first of these is the search of a compromise between the predicted outcome of the introduction of policy instruments and the possibility of their adjustment to the changing reality. The selection of instruments frequently stems from their expected effectiveness and social acceptability. This gives preference to the instruments whose outcomes are clearly predictable (and to which ameliorating measures can

be applied), e.g., recycling targets, taxes. On the other hand, this self-binding character of an instrument exerts a negative impact upon its adaptability to new conditions, e.g., those emerging from eco-innovations. The second challenge is connected with promoting the coherence of the policy process that aims to develop and implement the specific instruments. This pertains to the process aspect, i.e., the cohesion of policy processes at various levels- integration of actions on the EU and member state levels. In certain cases, the top-down approach introduced by the European Commission will constitute the foundation of the policy mix. Simultaneously, the significance of national and even sub-national approaches (e.g., trade-offs between differentiation and depth of instruments) is emphasized in numerous instruments (Wilts et al., 2016; Wilts & O'Brien, 2019). The third challenge is the coordination of instruments to guarantee that all activities contribute to strategic goals. This raises the issue of assignment of the coordinating function. The multi-facetedness of circular economy makes it difficult to assign the issue to one specific ministry. On the other hand, the development of a new institution may introduce unnecessary complexity, and protract the CE transition process by the loss of strategic priority and political will. Therefore, the question of who should coordinate the high-level strategic CE policy mix remains open.

The verification of the application of the identified instruments proved that CE-supporting instruments are already in place in Poland. However, they are fragmented and act merely upon individual transition barriers. The comprehensiveness of the support is required in the context of stimulating the CE transition. This entails the requirement of new, tailor-made policy instruments to be introduced, especially in the nodality and organization-based aspects.

Further research should examine the effectiveness of individual instruments as well as the whole policy mix in specific conditions. They can be evaluated. Their evaluation can be made by means of key assessment criteria, such as the effectiveness or dynamic efficiency, e.g., via case studies. The examination of the nature of policy processes and their coherence, as well as their impact on the components of a policy mix and their consistency constitute promising venues for prospective research.

Bibliography

Legal Acts

- Act on Tidiness and Order in Municipalities, 13.09.1996 [ustawa z dnia 13 września 1996 r. o utrzymaniu porządku i czystości w gminach], consolidated text: Journal of Laws 2021 item 888, as amended.
- Act on Public Procurement, 11.09.2019 [ustawa z dnia 11 września 2019 r. – Prawo zamówień publicznych], consolidated text: Journal of Laws 2021 item 1129, as amended.
- Dyrektywa Parlamentu Europejskiego i Rady (UE) 2018/851 z dnia 30 maja 2018 zmieniającą dyrektywę 2008/98/WE w sprawie odpadów (tzw. ramowa dyrektywa odpadowa). (2018). Retrieved from <https://eur-lex.europa.eu/legal-content/PL/TXT/PDF/?uri=CELEX:32018L0851&from=PL> (28.30.2022).
- Dyrektywa Parlamentu Europejskiego i Rady (UE) 2019/904 z dnia 5 czerwca 2019 r. w sprawie zmniejszenia wpływu niektórych produktów z tworzyw sztucznych na środowisko (tzw. dyrektywa plastikowa). (2019). Retrieved from <https://eur-lex.europa.eu/legal-content/PL/TXT/PDF/?uri=CELEX:32019L0904&from=PL> (15.12.2021).
- Krajowy Plan Gospodarki Odpadami 2022* [Uchwała Nr 88 Rady Ministrów z dnia 1 lipca 2016 r. w sprawie Krajowego planu gospodarki odpadami 2022, M.P. z 2016 r. poz. 784, zał.]. (2016). Retrieved from <https://sip.lex.pl/akty-prawne/mp-monitor-polski/krajowy-plan-gospodarki-odpadami-2022-18334576> (17.10.2021).

Literature

- Adams, K., Osmani, M., Thorpe, T., & Thornback, J. (2017). Circular Economy in Construction: Current Awareness, Challenges and Enablers. *Proc. Inst. Civil Eng. Waste Resour. Manag.*, 170(1), 15–24.
- Adjei-Bamfo, P., Maloreh-Nyamekye, T., & Ahenkan, A. (2019). The Role of E-Government in Sustainable Public Procurement in Developing Countries: A Systematic Literature Review. *Resour. Conserv. Recycl.*, 142, 189–203.
- Alhola, K., Salmenperä, H., Ryding, S. O., & Busch, N. J. (2017). *Circular Public Procurement in the Nordic Countries*. Rosendahls: Nordic Council of Ministers, TemaNord.
- Alhola, K., & Salmenperä, H. (2019). *Summary Report Work Package 2.1 State-of-the-Art on Circular Procurement Policy in the Baltic Sea Region*. Helsinki. Retrieved from <http://circularpp.eu/wp-content/uploads/2019/06/Summary-Report-WP-2.1-State-of-the-art-of-Circular-Procurement-Policy.pdf> (15.02.2022).
- Aranda-Usón, A., Portillo-Tarragona, P., Marín-Vinuesa, L. M., & Scarpellini, S. (2019). Financial Resources for the Circular Economy: A Perspective from Businesses. *Sustainability*, 11, 888.

- Arditi, S., & Wachholz, C. (2017). *Policy Options for Circular Economy. An EEB Report and Recommendations for the Italian Ministry for the Environment, Land, Sea*. Brussels: European Environmental Bureau (EEB).
- Bhave, P., & Sadhwani, K. (2016). Solid Waste Management Legislation: A Review. *Environmental Policy and Law*, 46, 165–190.
- Bicket, M., & Vanner, R. (2016). Designing Policy Mixes for Resource Efficiency: The Role of Public Acceptability. *Sustainability* 8(4), 366.
- Bouwman, I. M., Gerritsen, A. L., Kamphorst, D. A., & Kistenkas, F. H. (2015). *Policy Instruments and Modes of Governance in Environmental Policies of the European Union: Past, Present and Future* (WOT-technical report 60, pp. 1–46, Rep.). Wageningen: Wageningen University.
- Circle Economy. (2019). *The Circularity Gap Report*. Amsterdam: Circle Economy. Retrieved from https://docs.wixstatic.com/ugd/ad6e59_ce56b655bcdc4f67ad7b5ceb5d59f45c.pdf (18.12.2021).
- Cruz-Pastrana, J. L., & Franco-García, M. L. (2019). Feasibility Analysis of a Cap-and-Trade System in Mexico and Implications to Circular Economy. In: M. L. Franco-García, J. C. Carpio-Aguilar & H. Bressers (Eds.), *Towards Zero Waste* (pp. 61–80). Cham: Springer.
- Dovers, S. R., & Hezri, A. A. (2010). Institutions and Policy Processes: The Means to the Ends of Adaptation. *Wiley Interdisciplinary Reviews: Climate Change*, 1, 212–231.
- EEA. (2016a). *More From Less: Material Resource Efficiency in Europe: 2015 Overview of Policies, Instruments and Targets in 32 Countries*. No 10/2016. Copenhagen: European Environment Agency.
- EEA. (2016b). *Environmental Taxation and EU Environmental Policies*. No 17/2016. Copenhagen: European Environment Agency.
- EEA. (2015). *Waste Prevention in Europe: The Status in 2014*. EEA Report No 6/2015. Copenhagen: European Environment Agency.
- Ellen MacArthur Foundation. (2015). *Delivering the Circular Economy: A Toolkit for Policymakers*. Cowes: Ellen MacArthur Foundation.
- Ekins, P., & Hughes, N. (2017). *Resource Efficiency: Potential and Economic Implications: A Report by the International Resource Panel*. Nairobi: United Nations Environment Programme.
- Ellen MacArthur Foundation [EMF]. (2015). Retrieved from <https://www.ellenmacarthurfoundation.org/ce100> (16.12.2021).
- EU Ecolabels Key Figures. (2021). Retrieved from <https://ec.europa.eu/environment/ecolabel/facts-and-figures.html> (28.03.2022).
- EU Environmental Implementation Review 2019 Country Report – Poland. (2019). Brussels: European Commission.

- European Commission. (2014). *Questions and Answers on the Commission Communication “Towards a Circular Economy” and the Waste Targets Review*. Retrieved from https://ec.europa.eu/commission/presscorner/detail/el/MEMO_14_450 (16.12.2021).
- European Commission. (2015a). *Closing the Loop: An Action Plan for the Circular Economy*. Brussels: European Commission.
- European Commission. (2015b). *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. Closing the Loop: An EU Action Plan for the Circular Economy*. COM (2015) 614/2. Brussels: European Commission.
- European Commission. (2017). *Public Procurement for a Circular Economy. Good Practice and Guidance*. Retrieved from https://ec.europa.eu/environment/gpp/pdf/CP_European_Commission_Brochure_webversion_small.pdf (27.12.2021).
- European Parliament. (2017). *Green Public Procurement and the EU Action Plan for the Circular Economy*. Brussels: European Parliament.
- Flanagan, K., Uyarra, E., & Laranja, M. (2011). Reconceptualising the “Policy Mix” for Innovation. *Research Policy*, 40(5), 702–713.
- Gargiulo, A., Girardi, P., & Mela, G. (2019). *Life Cycle Assessment Della Produzione di Energia Elettrica Nazionale Attuale ed al 2030*. Rapporto Ricerca di Sistema 19012876. Milano: RSE. Retrieved from http://www.rse-web.it/temi.page?RSE_originalURI=/temi/sottotema/documenti/1&RSE_manipulatePath=yes&docType_1=yes&resultList=yes,yes&objId=1&docIdType=1,1&typeDesc=Rapporto,Report&country=ita (27.11.2021).
- Gavertsson, I., Milios, L., & Dalhammar, C. (2018). Quality Labelling for Re-Used ICT Equipment to Support Consumer Choice in the Circular Economy. *J. Consum. Policy*, 1–25.
- Geissdoerfer, M., Savaget, P., Bocken, N. M. P., & Hultink, E. J. (2017). The Circular Economy: A New Sustainability Paradigm?. *J. Clean. Prod.*, 143, 757–768. doi:10.1016/j.jclepro.2016.12.048.
- Geng, Y., Zhu, Q., Doberstein, B., & Fujita, T. (2009). Implementing China’s Circular Economy Concept at the Regional Level: A Review of Progress in Dalian, China. *Waste Management*, 29(2), 996–1002.
- GUS. (2019). *Polska w liczbach 2019*. Retrieved from: <https://stat.gov.pl/obszary-tematyczne/inne-opracowania/inne-opracowania-zbiorcze/polska-w-liczbach-2019,14,12.html> (28.03.2022).
- Hammill, A., Harvey, B., Echeverria, D. (2013). Knowledge for Action: An Analysis of the Use of Online Climate Knowledge Brokering Platforms. *Knowledge Management for Development Journal*, 9, 72–92.

- Hartley, K., van Santen, R., & Kirchherr, J. (2020). Policies for Transitioning Towards a Circular Economy: Expectations from the European Union (EU), *Resources, Conservation and Recycling*, 155. doi: 10.1016/j.resconrec.2019.104634.
- Hauschild, M. Z., Herrmann, C., & Kara, S. (2017). An Integrated Framework for Life Cycle Engineering. *Procedia CIRP*, 61, 2–9.
- Henstra, D. (2016). The Tools of Climate Adaptation Policy: Analysing Instruments and Instrument Selection. *Climate Policy*, 16(4), 496–521.
- Hood, C. C. (1983). *The Tools of Government*. London: Macmillan Press.
- IEA. (2011). *Summing Up the Parts, Combining Policy Instruments for Least-Cost Climate Mitigation Strategies*. Paris: International Energy Agency.
- Information of the Minister of the Environment on Municipal Waste Incineration Plants and Their Place in the Waste Management System (in Polish: Informacja Ministra Środowiska na temat spalarni odpadów komunalnych i ich miejsca w systemie gospodarki odpadami)*. (2019). Retrieved from <https://odpady.net.pl/wp-content/uploads/2019/04/Informacja-Ministra-%C5%9Arodowiskana-temat-spalarni-odpad%C3%B3w-komunalnych.pdf> (21.11.2021).
- Jarząbek, A., Juszczak, A., Szpor, A., & Maj, M. (2020). *Czy zaleją nas śmieci?. Policy Paper*, 1/2020. Warszawa: Polski Instytut Ekonomiczny.
- Klaus, J., Mangalagiu, D., King, P., & Rodríguez-Labajos, B. (2019). Approach to Assessment of Policy Effectiveness. In: United Nations Environment Programme, *Global Environment Outlook GEO 6: Healthy Planet, Healthy People*. Cambridge: Cambridge University Press.
- Konsultacje KPO. (2021). Retrieved from <https://www.gov.pl/web/planodbudowy/konsultacje-kpo2> (28.03.2022).
- Korhonen, J., Honkasalo, A., & Seppälä, J. (2018). Circular Economy: The Concept and Its Limitations. *Ecol. Econ.*, 143, 37–46.
- Landry, R., & Varone, F. (2005). Choice of Policy Instruments: Confronting the Deductive and Interactive Approaches. In: P. Eliadis, M. M. Hill & M. Howlett (Eds.), *Designing Government: From Instruments to Governance* (pp. 106–131). Kingston, ON: McGill-Queen's University Press.
- Maitre-Ekern, E. (2017). The Choice of Regulatory Instruments for a Circular Economy. In: K. Mathis & B. R. Huber (Eds.), *Environmental Law and Economics* (pp. 305–334). Cham: Springer.
- Masi, D., Kumar, V., Garza-Reyes, J. A., & Godsell, J. (2018). Towards a More Circular Economy: Exploring the Awareness, Practices, and Barriers from a Focal Firm Perspective. *Prod. Plan. Control.*, 29(6), 539–550.

- Monier, V., Hestin, M., Cave, J., Laureysens, L., Watkins, E., Reisinger, H., & Porsch, L. (2014). *Development of Guidance on Extended Producer Responsibility*. Final Report for DG Environment. Brussels: European Commission.
- NIK. (2019). Wystąpienie pokontrolne. Działania na rzecz ograniczenia powstawania odpadów z tworzyw sztucznych i ich skutecznego zagospodarowania w Polsce. LKR.410.023.02.2019. Warszawa: Najwyższa Izba Kontroli.
- Nusholz, J. L., Rasmussen, F. N., & Milios, L. (2019). Circular Building Materials: Carbon Saving Potential and the Role of Business Model Innovation and Public Policy. *Resour. Conserv. Recycl.*, 141, 308–316.
- Odpady przemysłowe w Polsce – co możemy z nimi zrobić. (2021). *Przemysł i Środowisko*, 9 września 2021.
- OECD. (2001). *Extended Producer Responsibility: A Guidance Manual for Governments*. Paris: OECD.
- Park, J., Park, J. M., & Park, H. S. (2019). Scaling-Up of Industrial Symbiosis in the Korean National Eco-Industrial Park Program: Examining Its Evolution over the 10 Years Between 2005–2014. *J. Ind. Ecol.*, 23(1), 197–207.
- PARP. (2021). *Ocena zapotrzebowania na wsparcie przedsiębiorstw w zakresie gospodarki o obiegu zamkniętym (circular economy). Raport końcowy*. Retrieved from https://www.parp.gov.pl/storage/publications/pdf/Raport-kocowy_Ocena-zapotrzebowania-na-wsparcie-przedsiębiorstw-w-zakresie-gospodarki-o-obiegu-zamkniętym-circular-economy_WCAG.pdf (28.03.2022).
- Patil, R. A., & Ramakrishna, S. A. (2020). Comprehensive Analysis of E-Waste Legislation Worldwide. *Environ Sci Pollut Res*, 27, 14412–14431.
- Popescu, R. F. D. (2008). *Industrial Ecology and Eco-Industrial Parks: Principles and Practice*. doi:10.2139/ssrn.1317231.
- Reike, D., Vermeulen, W. J. V., & Witjes, S. (2018). The Circular Economy: New or Refurbished as CE 3.0? — Exploring Controversies in the Conceptualization of the Circular Economy through a Focus on History and Resource Value Retention Options. *Resour. Conserv. Recycl.*, 135, 246–264. doi: 10.1016/j.resconrec.2017.08.027.
- Ring, I., & Schröter-Schlaack, C. (2011). *Instrument Mixes for Biodiversity Policies*. Leipzig: Helmholtz Centre for Environmental Research.
- Roadmap for Transformation Towards Circular Economy*. (2019). Retrieved from https://www.mpit.gov.pl/media/58665/Mapa_drogowa.pdf (18.11.2021).
- Rogge, K. S., & Reichardt, K. (2013). *Towards a More Comprehensive Policy Mix Conceptualization for Environmental Technological Change: A Literature Synthesis*. Working Papers “Sustainability and Innovation”, No. S3/2013.
- Rogge, K. S., & Reichardt, K. (2016). Policy Mixes for Sustainability Transitions: An Extended Concept and Framework for Analysis. *Res. Policy*, 45(8), 1620–1635.

- Saavedra, Y. M., Iritani, D. R., Pavan, A. L., & Ometto, A. R. (2018). Theoretical Contribution of Industrial Ecology to Circular Economy. *J. Clean. Prod.*, 170, 1514–1522.
- Schneider, A., & Ingram, H. (1990). Behavioral Assumptions of Policy Tools. *The Journal of Politics*, 52, 510–529.
- Silva, F. C., Shiba, F. Y., Kruglianskas, I., Barbieri, J. C., & Sinisgalli, P. A. A. (2019). Circular Economy: Analysis of the Implementation of Practices in the Brazilian Network. *Revista de Gestao*, 26(1), 39–60.
- Stahel, W. R., & Reday-Mulvey, G. (1977). *The Potential for Substituting Manpower for Energy; Report to DG V for Social Affairs*. Commission of the European Communities, Brussels (research contract No. 760137 Programme of Research and Actions on the Development of the Labour Market), Study No. 76/13. Geneva: Battelle, Geneva Research Centre.
- Strategia na rzecz Odpowiedzialnego Rozwoju*. (2017). Retrieved from <https://www.gov.pl/web/fundusze-regiony/informacje-o-strategii-na-rzecz-odpowiedzialnego-rozwoju> (28.03.2022).
- Stan wiedzy Polaków nt. gospodarki obiegu zamkniętego*. Responsible Business Forum (Forum odpowiedzialnego biznesu). Retrieved from <https://odpowiedzialny-biznes.pl/publikacje/stan-wiedzy-polakow-nt-gospodarki-obiegu-zamknietego/> (28.03.2022).
- Statistics & Graphs*. (2021). Retrieved from https://ec.europa.eu/environment/emas/emas_registrations/statistics_graphs_en.htm (28.03.2022).
- The Ex'tax Project. (2016). *New Era New Plan. Europe. A Fiscal Strategy for an Inclusive Circular Economy*. Utrecht: The Ex'Tax Project Foundation.
- The Ex'tax Project. (2019). *Tax as a Force for Good: Aligning Tax Systems with the SDGs and the Inclusive Circular Economy. Case Study Bangladesh*. Utrecht: The Ex'Tax Project Foundation.
- Tischner, U., Schmincke, E., Rubik, F., & Proslar, M. (2000). *How to Do Ecodesign? A Guide for Environmentally and Economically Sound Design*. Berlin: German Federal Environmental Agency.
- Urząd Zamówień Publicznych. (2017). *Stan zrównoważonych zamówień publicznych w 2017 roku – raport*. Warszawa.
- Valenzuela-Venegas, G., Salgado, J. C., & Díaz-Alvarado, F. A. (2016). Sustainability Indicators for the Assessment of Eco-Industrial Parks: Classification and Criteria for Selection. *Journal of Cleaner Production*, 133, 99–116.
- Vence, X., & López Pérez, S. d. J. (2021). Taxation for a Circular Economy: New Instruments, Reforms, and Architectural Changes in the Fiscal System. *Sustainability*, 13, 4581.
- Vence, X., & Pereira, A. (2019). Eco-Innovation and Circular Business Models as Drivers for a Circular Economy. *Contad. Adm.*, 64, 1–19.

- van Vught, F., & de Boer, H. (2015). Governance Models and Policy Instruments. In: J. Huisman, H. de Boer, D. D. Dill & M. Souto-Otero (Eds.), *The Palgrave International Handbook of Higher Education Policy and Governance* (pp. 38–56). Basingstoke: Palgrave.
- Wang, X., Liu, Y., & Ju, Y. (2018). Sustainable Public Procurement Policies on Promoting Scientific and Technological Innovation in China: Comparisons with the US, the UK, Japan, Germany, France, and South Korea. *Sustainability*, 10(7), 2134.
- Wilts, H., von Gries, N., & Bahn-Walkowiak, B. (2016). From Waste Management to Resource Efficiency: The Need for Policy Mixes. *Sustainability*, 8, 622.
- Wilts, H., & O'Brien, M. (2019). A Policy Mix for Resource Efficiency in the EU: Key Instruments, Challenges and Research Needs. *Ecological Economics*, 155, 59–69.
- Witjes, S., & Lozano, R. (2016). Towards a More Circular Economy: Proposing a Framework Linking Sustainable Public Procurement and Sustainable Business Models. *Resour. Conserv. Recycl.*, 112, 37–44.
- Xing, J., Silva, J., & Duarte de Almeida, I. (2017). *Interest, Design and Assessment of Eco-Industrial Parks in China within a Circular Economy Paradigm*. Cambridge: University of Cambridge.
- Zaleski, P., & Chawla, Y. (2020). Circular Economy in Poland: Profitability Analysis for Two Methods of Waste Processing in Small Municipalities. *Energies*, 13(19), 5166. doi: 10.3390/en13195166.
- Zgut, E., Zbytniewska, K., Hosnedlova, P., & Szalai, P. (2018). *Waste in the Visegrad Four: Poland Leading the Way*. Retrieved from <https://www.euractiv.com/section/circular-economy/news/waste-in-the-visegrad-four-poland-leading-the-way/> (17.11.2021).
- Zhao, R., Peng, H. & Jiao, W. (2021). Dynamics of Long-Term Policy Implementation of Eco-Transformation of Industrial Parks in China. *Journal of Cleaner Production*, 280, 124364.

Summary

The objective of the study was to review policy instruments stimulating circular economy (CE). The review was completed using analytical frameworks; primary material was compiled using the Science Direct database. The following four groups of potential instruments were identified and characterized: nodality, authority, treasure, and organization-based. Subsequently, an in-depth analysis was performed in order to examine their implementation in Poland. The study revealed a broad spectrum of application of legislative and economic instruments (targets, direct legal regulations, extended producer responsibility, taxation). On the other hand, the application of information instruments was revealed to be insufficient (information campaigns, eco-labelling) and the application of organization-based instruments to be negligible (eco-industrial parks, circular public procurement). We argue that a comprehensive character of support is required.

This denotes the need for new, tailor-made policy instruments to be introduced. Finally, the article presents challenges for the policy mix in relation to the transition to CE, and suggests avenues for future research.

KEYWORDS: policy instruments, legal & economic instruments, literature review, circular economy

Streszczenie

Celem artykułu jest przegląd instrumentów politycznych stymulujących gospodarkę cyrkulacyjną. Przegląd został wykonany z użyciem bazy Science Direct. Cztery grupy potencjalnych instrumentów zostały zidentyfikowane i scharakteryzowane: informacyjne, legislacyjne, ekonomiczne, organizacyjne. Kolejno przeprowadzona została pogłębiona analiza zastosowania wyróżnionych instrumentów w warunkach Polski. Badania potwierdziły szerokie wykorzystywanie instrumentów legislacyjnych i ekonomicznych (cele, bezpośrednie regulacje prawne, poszerzona odpowiedzialność producenta, opodatkowanie), niewystarczające instrumentów informacyjnych (kampanie informacyjne, eko-znakowanie) oraz znikome organizacyjnych (ekologiczne parki przemysłowe, cyrkulacyjne zamówienia publiczne). Wyniki badań wskazują, że konieczna jest kompleksowość wsparcia, co oznacza wymóg wprowadzania nowych, dedykowanych instrumentów politycznych.

SŁOWA KLUCZOWE: instrumenty polityczne, prawne & ekonomiczne instrumenty, przegląd literatury, gospodarka cyrkulacyjna

Nota o autorze

Agnieszka Karman – dr hab., prof. UMCS, Uniwersytet Marii Curie-Skłodowskiej; główne obszary działalności naukowej: zarządzanie środowiskiem, ekonomia ekologiczna, rozwój zrównoważony przedsiębiorstw; e-mail: agnieszka.karman@poczta.umcs.lublin.pl; ORCID: 0000-0001-7429-5938.

