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The concept of the circular economy

Pojęcie gospodarki w obiegu zamkniętym

ABSTRACT

In the light of limited resources the implementation of a circular economy seems to be very urgent. We use data from Central European countries to show some indicators of the circular economy. The Study by Politico reveals that circularity leaders in Europe are West European countries. Contrary to expectations, the leaders in lower production of waste were Poland, The Czech Republic and countries from Eastern and Central Europe. Several major barriers to the circular economy exist in this region including: limited access to capital, a lack of research, rigid public procurement practices that make innovative technologies unattractive and a lack of environmental awareness.

STRESZCZENIE

Wobec ograniczonych zasobów przyrodniczych wdrożenie gospodarki o obiegu zamkniętym wydaje się bardzo pilne. W artykule, korzystając z danych z krajów Europy Środkowej, pokazano niektóre wskaźniki gospodarki o obiegu zamkniętym. Badanie przeprowadzone przez POLITICO ujawniło, że liderami cyrkularności w Europie są kraje Europy Zachodniej. Wbrew oczekiwaniom liderami, jeśli chodzi o małą produkcję odpadów, były Polska, Czechy i inne kraje z Europy Środkowo-Wschodniej. W tym regionie istnieje jednak kilka głównych barier dla gospodarki o obiegu zamkniętym, w tym: ograniczony dostęp do kapitału, brak badań, sztywne praktyki zamówień publicznych, które czynią innowacyjne technologie nieatrakcyjnymi, oraz brak świadomości.

Keywords: circular economy, Central European countries, innovation, production of waste, recycling

Słowa kluczowe: gospodarka o obiegu zamkniętym, kraje Europy Środkowej, innowacje, produkcja odpadów, recykling.

1. WHAT IS THE CONCEPT OF THE CIRCULAR ECONOMY?

We should introduce the concept of circularity due to limited resources and approaching limits to growth (Meadows, [Donnella], Meadows, [Denis], Randers, & Behrens, 1972). Lanie Millar (2019) stated that the earth has a “[...] limited assimilative capacity and as such the economy and environment must coexist in equilibrium”. Scholars are proposing the circular economy concept. In the underlying idea of a closed-loop economy the following concepts were formulated: cradle-to-cradle (C2C), regenerative design, sharing economy, green economy, performance economy, sustainable development, product-service systems and eco-efficiency (McDonough, n.d.; Haas, Krausmann, Wiedenhofer, & Heinz, 2015; Tukker & Suh, 2009). There is a lack of consensus concerning the conceptualization of CE influence in the way it is measured. The relevance of this subject was recognized by the

EU, which, in a strategic plan for CE, stated that “[to] assess progress towards a more circular economy and the effectiveness of action at EU and national level, it is important to have a set of reliable indicators” (European Commission, 2015). Responding to this call for action, various scientific attempts have been made at multiple levels and tailored to a variety of sectors. For instance, M. Saidani, B. Yannou, Y. Leroy, F. Cluzel, & A. Kendall (2019) conducted a systematic literature review of circularity-indicators developed by scholars, consulting companies and governmental agencies, which resulted in a taxonomy. The analysis found 55 sets of C-indicators, coming from 27 journal articles, and other resources (Saidani et al., 2019).

Notwithstanding an abundance of circular models, principles and strategies provided in the literature, the implementation of the approaches into every day practice is

challenging. One of the main problems with implementing circularity is that professionals are not always aware of the full spectrum of circular approaches. Likewise, many CE experts lack the intricate knowledge that is accumulated through managing assets throughout their lifecycle. Following a Design Science Research-base Foundation (Coenen, Haanstra, Braaksma, & Santos, 2020). Despite this action, so far there is a shortage of a definition of CE or criteria for assessing the measures to improve the circularity of the economy. According to the formulation of a widely accepted CE definition by EMF: "A Circular economy is an industrial system that is restorative or regenerative by intention and design (...). "It replaces the end-of-life concept with restoration, eliminates the use of toxic chemicals, which impair reuse, and aims for the elimination of waste through the superior design of materials, products, systems, and, within this, business models" (Coenen et al., 2020; Ghisellini, Cialani, & Ulgiati, 2016)

Another definition was given by Haas et al. (2015), but convincing strategy, which aims at reducing both input of virgin materials and output of wastes by closing economic and ecological loops of resource flows. This article applies a sociometabolic approach to assess the circularity of global material flows. All societal material flows globally and in the European Union (EU-27, following the definition by the United Nations' (UN) GEO5 report, which states that, in that kind of economy, material flows are made up of either biological nutrients designed to re-enter the biosphere, or materials designed to circulate within the economy (reuse and recycling) (GEO5, 2012).

M. Braungart together with W. McDonough (2002) underlined the Cradle to Cradle™ concept which needs to be more highlighted. This philosophy considers all the materials involved in industrial and economic processes to be nutrients, of which there are two main categories: technical and biological. The Cradle to Cradle framework focuses on design for effectiveness in terms of the positive impact of the products, which fundamentally differentiates it from the traditional design approach consisting in reducing negative impacts (from cradle to grave).

It is used in models which evaluate the production of renewable energy, diversity of ecosystems and of green energy consumption (Browne, O'Regan, & Moles, 2009; Busu, 2019; Trica, Banacu, & Busu, 2019; Vută [Mariana], Vută [Mihai], Enciu, & Cioacă, 2018). Contrary to these opinions, other scholars (Ayres, 1995; De Wolf, Pomponi, & Moncastre, 2017) have criticized the C2C concept in industrial process strategies from "cradle to grave" where products are not being reused. Other researchers, e.g. A. Lucaci & C. Nastase (2019) claim that, besides the European Union's policies and strategies, Member States should adopt various measures to strengthen the concept of the circular economy. In particular, the high status of SMEs in Europe, including family firms, requires an analysis of what the CE means

for these firms. Some analyses actually show that, inconsistently with the Environmental Kuznets Curve (EKC), environmental quality cannot be maintained or improved via economic growth. Instead, improvements in environmental quality, as measured by a reduction in pollution, can only be achieved by an increase in the environmental self-renewal rate or the recycling ratio (George, Lin, & Chen, 2015).

The reasons for moving from a linear economy (LE) to a CE are multiple. Yet, it is sufficient to address only the main drawbacks of an LE, namely the main advantages of a CE.

2. INDICATORS OF CIRCULAR ECONOMY IN CENTRAL EUROPEAN COUNTRIES

A close look at countries' achievements of the EU's goals of transforming economies towards circularity while diminishing garbage production reveals unforeseen leaders and laggards. The basic factor that reduces Western European countries' circularity is their high level of garbage. Although countries such as The Netherlands, Denmark and Sweden rank pretty well in eco-innovation and recycling, their scores are reduced by high levels of organic waste. Meanwhile, the countries that produce the least amount of waste per capita are all from Central and Eastern Europe. The Czech Republic came fourth in the overall ranking, buoyed by having the third-lowest level of municipal waste and the fifth-lowest food waste score out of all 28 countries. Poland and the Czech Republic rank near the top of POLITICO's list of the EU's most circular economies, while apparently pro-environment Nordic countries lag behind.

The European Union has been pushing the idea of a circular economy — one in which almost nothing is wasted — for years. In January, to get a sense of how well countries and the EU are doing in reaching that goal, the European Commission published metrics it plans to use to track an economy's circularity. Poland and the Czech Republic rank near the top of POLITICO's list of the EU's most circular economies, while ostensibly green Nordic countries lag behind (POLITICO, 2018).

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Poland is doing well in some areas, in comparison to other countries, particularly per capita waste production with 307 kg (2nd) a year EPR coverage with a total of 12 schemes spanning 5 sectors. Additionally, Poland ranked very reasonably in POLITICO's circular economy index (6th). Waste reuse is surprisingly high in Poland 123 %. It seems that circularity may be easier to achieve in Poland than other countries. It is due to economic backwardness. Although Poland is progressing in CE, it is evidently regressive in other areas. The huge amount of garbage being burned in

Table 1. The circular economy ranking

Country	Municipal waste (per year per person) [kg]	Municipal recycling rate [kg]	Food waste (per year per person) [%]	Share of goods traded that are recyclable raw materials [%]	Material reuse rate [%]	Patents related to circular economy since 2000
Romania	261	76	13	0.13	2	34
Poland	307	247	44	0.18	13	298
Czech Republic	339	81	34	0.25	7	72
Slovakia	348	111	23	0.15	5	10
Estonia	376	265	28	0.26	11	3
Hungary	379	175	35	0.23	5	36
Croatia	403	91	21	0.23	5	4
Bulgaria	404	105	32	0.11	3	10
Latvia	410	110	25	0.18	3	11
Belgium	420	345	54	0.22	17	105
Spain	443	135	30	0.20	8	210
Sweden	443	212	49	0.19	7	49
Lithuania	444	119	48	0.15	4	19
Portugal	461	132	31	0.26	2	22
Slovenia	466	72	58	0.41	8	8
United Kingdom	483	236	44	0.35	15	292
Italy	497	179	45	0.19	19	294
Greece	498	80	17	0.14	1	5
Finland	504	189	42	0.06	7	111
France	511	136	42	0.24	18	542
Netherlands	520	541	53	0.17	27	169
Ireland	563	216	41	0.18	2	38
Austria	564	209	58	0.32	9	122
Luxembourg	614	175	48	0.97	11	24
Malta	621	76	7	0.12	10	1
Germany	627	149	66	0.25	11	1260
Cyprus	640	327	17	0.13	3	4
Denmark	777	146	48	0.31	10	53

Source: POLITICO, 2018

Poland, traced also from abroad by the so called “waste mafia” has prompted the EU commission to monitor the situation (ecopreneur.eu, 2019). In addition, major obstacles to the CE exist including: limited access to capital, a lack of research, rigid public procurement practices that make innovative technologies unattractive and a lack of awareness of both customers and companies as to the benefits of a circular economy.

Some data presenting the Polish context in the circular economy from Ecopreneur are shown below:

- Eco-innovation Index resource efficiency: 26th place
- POLITICO's circular economy index: 6% of SMEs minimizing waste: 55%, 17th
- Per capita waste production: 307 kg, 2nd ↑
- Per capita waste incineration: 143 kg,
- A recycling rate of municipal waste: 35%, 15th ↑
- Recycling rate of packaging: 58%, 22nd ↑
- Circular material use rate: 10%, 9th ↓
- EPR schemes: 12 in 5 sectors

CONCLUSION

The current literature regards the transformation from a linear to a circular economy as a guide towards sustainable business models, presenting companies mainly with possibilities for closing their material and energy circulation. Based on that, the aim of the present study was to introduce a discussion on circularity (European Circular Economy Stakeholder Platform, n.d.). At first glance, Poland belongs amongst the less circular economy focused EU member states. However, there are a few positive indicator exceptions where the country performs very well, exceeding the majority of the competition, such as waste per capita. Poland should further stimulate waste prevention by design, sharing, maintenance, repair and reuse, before recycling, incineration and landfill. It should start a Circular Procurement including a free training programme and commitments from companies the country should introduce tax relief as specially decreased VAT rates for resold goods and transactions with clearly defined social reasons and discuss the EU VAT rate proposal in the context of the CE circular economy.

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