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Lost in Transition? Market Failure in the Implementation of the Circular Economy. A Comparative Analysis of the Netherlands and Poland

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Abstract

It is necessary for economies to transition to a circular economy (CE). What particularly inhibits the implementation of the CE in linear economies is market failures, whose theoretical principles are embedded in modern welfare economics and neoclassical economics. Market failures shape the functioning of different areas of the markets, including the allocation of and access to resources, competition, and cooperation, among others. Due to their presence in the market, opportunities for industrial symbiosis based on intersectoral cooperation and the creation of resource-efficient production systems are limited. It is crucial because the functioning of local actors within an industrial symbiosis significantly favours the promotion and development of a CE. The aim of the paper is to identify market failures that limit the implementation of CEs in traditional linear economies.
The article is based on focus group interviews (FGI) conducted with four groups of stakeholders in the Netherlands and Poland: academia, society, business and the government. The main findings show that one of the greatest barriers in Poland is stakeholders' low awareness of the CE, which influences their possibilities of cooperating and networking. Existing

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laws additionally limit opportunities to develop the CE. In contrast, in the Netherlands, where awareness is deeply embedded in the culture, education system and upbringing, the level of market failure is lower.

Keywords: circular economy, linear economy, transition to the CE, market failures

JEL: O18, Q56, R11

Introduction

The principles of the circular economy (CE) are challenging to implement. It is a complex and long-lasting process, but nowadays, it seems to be a necessity (Wysokińska 2016, p. 71; Kirchherr, Reike, and Hekkert 2017, pp. 228–230). Transitioning to the CE has been described as "a fundamental change in the structure, culture and practices of a societal (sub)system that is the result of a co-evolution of economic, technological, institutional, cultural and ecological developments at different scale levels" (Grin, Rotmans, and Schot 2010, p. 109; Bosman and Rotmans 2016, p. 3; van Langen et al. 2021, p. 2; Wysokińska 2020, p. 159). Although many steps have already been taken for the transition to the CE, we are still a long way from the full implementation of CE principles (Haas et al. 2015, p. 775; Donner and de Vries 2020, p. 1932; Ghisellini and Ulgiati 2020, pp. 144–145; Towa, Zeller, and Achten 2021, pp. 844–845). The transition towards the CE is inhibited by many barriers, the most common of which are technological, economic, institutional and social (De Jesus and Mendonça 2018, pp. 75–89; Kinnunen and Kaksonen 2019, pp. 153–154).

The transition is especially challenging for countries and regions with linear economies. What can limit the implementation of the CE in these territories is market failures. The theoretical principles of market failures can be found in modern welfare economics and neoclassical economics. Market failures are usually defined as the non-efficient and non-Pareto-optimal allocation of resources (Ledyard 1989, p. 185; Stiglitz 2004, pp. 90–105). However, Cunningham (2011, p. 13) states that market failure does not mean that a market is not working at all, but that it is not working efficiently because it is not delivering desirable products and services. In the literature, many types of market failures are distinguished (Cowen and Crampton 2002; Andrew 2008, pp. 394–396; Jackson and Jabbie 2019, pp. 3–8). In this paper, we adapt the most common types: public goods, externalities, imperfect competition, incompleteness of the market, and information asymmetry.

The market failures described in neoclassical economics can also be identified when implementing the CE (van Ewijk 2018, pp. 12–14; Ghisellini, Passaro, and Ulgiati 2021, pp. 149–150, 156–157; Barteková and Börkey 2022, pp. 18–20). In principle, while the types of market failures remain the same, regardless of economic development

and the principles on which this development is based, there is differentiation within particular market failures. Figure 1 presents our approach to market failures in individual areas of the CE.

Market failures are natural and inevitable within a market economy. What is important, however, is their scale and the intensity with which they affect the market, limiting its efficient functioning and the development of the entities operating in it. That is why this paper aims to identify market failures that limit the implementation of CEs in traditional economies. To achieve this aim, we conducted Focus Group Interviews (FGIs). The study was conducted with four stakeholder groups: academia, society, business, and the government, who we consider to be the main actors in the market.

The remainder of this paper is organised as follows. Section 2 outlines the theoretical backgrounds, including the definitions of market failures and CE barriers. It shows the connection between classical market failures distinguished in the neo-classical economy and typical barriers observed when implementing the CE. Section 3 presents the materials and methods. We also indicate the main principles of our research and the reasons for conducting it. Section 4 concentrates on the results. We show the differences not only between the groups of respondents but also between the researched regions. Section 5 includes a discussion and conclusion where we answer the research questions and sum up the results of our investigation.

Theoretical background

The concept of market failure is rooted in modern welfare economics. As Ledyard indicated, to understand market failure, one should understand market success, which is explained by Pareto optimality. It could be defined as the ability of idealised competitive markets to achieve an equilibrium allocation of resources (Ledyard 1989, p. 185). Market success is described by the First Fundamental Theorem of welfare economics (Arrow 1951, p. 507):

- there are enough markets,
- all consumers and producers behave competitively,
- an equilibrium exists.

In such a case, the allocation of resources in equilibrium is Pareto optimal (Bator 1958, pp. 353–355; Randall 1983, pp. 131–132; Ledyard 1989, pp. 185–189; Moreau 2004, pp. 849–850; Phelan and Rustichini 2018, pp. 979–981; Bimpizas-Pinis et al. 2021, p. 1). So, market failure arises when allocation in markets is neither efficient nor Pareto-optimal. Market failure was defined in this way by, among others, Bator (1958, pp. 351–379), Klaassen and Opschoor (1991, pp. 93–95), Winston

(2006, p. 2), and Conrad (2020, pp. 176–177). A similar definition was presented by Samuelson and Nordhaus (1992, p. 741), who also referred to the inefficient allocation of resources but in the context of an imperfection in the price system. Pearce (1986, p. 13) described it as "The inability of a system of private markets to provide certain goods either at all or at the most desirable or 'optimal' level". Lines, Marcouse, and Martin (2006, p. 167) indicated that market failure is represented by the forms of growth of monopolistic firms and other non-competitive organisations, and it happens when factors of production stand idle. As Cunningham (2011, p. 13) stated, the term "market failure" does not mean that a market is not working at all, but that it is not working efficiently because it is not producing desirable goods. The concept of market failure is often treated as a general justification for government intervention (e.g., Zerbe and McCurdy 1999, pp. 559–560; Bleda and Del Río 2013, pp. 1039–1040, Alvarez, Barney, and Newman 2015, p. 25).

The most common categories of market failures are public goods, externalities, imperfect competition, incompleteness of the market, and asymmetrical information (Randal 1983, p. 137; Moreau 2004, pp. 849–850; Stiglitz 2004, pp. 90–105; Jackson and Jabbie 2019; pp. 3–6). Other authors also add incomplete property rights to this list (e.g., Perman et al. 2003, p. 10; Acheson 2006, p. 121). Redmond (2018, pp. 417–418) presented market failure from a different point of view. He proposed a systems approach in contrast to earlier, classic research, where market failure was analysed with a transactional approach. It let him distinguish one more category of market failure – transaction costs. This category appears in the New Institutional Economy (NIE), which looks at the organisation of exchange from a market or hierarchical perspective. In NIE markets, when market conditions threaten to increase transaction costs, hierarchies (i.e., firms) are created to minimise these costs. This can be perceived as a reaction to market conditions to maximise profits, although from a neoclassical perspective, it constitutes a market failure (Chang 2002, pp. 544–546).

A different approach was presented in the evolutionary economy, where the market is seen as dynamic, chaotic, and constantly changing rather than tending to a state of equilibrium (Nelson and Winter 2002, pp. 24–25; Nelson 2008, pp. 1–12, 20; Schmidt 2018, pp. 792–797). From this point of view, market failures that are typical of a neoclassic economy are not failures. As Bleda and del Río (2013, p. 1049) indicated, common problems in the evolutionary economy, such as uncertainty, agents' limited knowledge, and difficulties in coordinating knowledge and its carriers, are sources of coordinator failure. In evolutionary markets, failures are explained by undeveloped or ineffective mechanisms and constituent markets.

In this paper, we look at market failure from the CE perspective (cf. van Ewijk 2018, pp. 11–14; Compagnoni and Stadler 2021, pp. 18–19; Cong and Thomsen 2021, p. 3;

Ghisellini, Passaro, and Ulgiati 2021, pp. 151–158; Barteková and Börkey 2022, pp. 8–11; Fullerton and He 2022, pp. 3–7). A CE is more likely to identify the barriers that derail or slow the transition towards a CE (Kirchherr, Reike, and Hekkert 2017, pp. 228–230; Neves and Marques 2022, pp. 2–4). The issue of barriers to implementing CE has been raised by many authors (see Tab. 1).

Table 1. Categories of barriers to implementing CE occurred in the literature

Author(s)	Category of barriers to implementing the CE								
	technological	market/economic	political/ institutional	legal/regulatory	social/cultural	organisational	supply chain	infrastructural	lack of information/ knowledge
Preston 2012	+	+	+		+	+	+	+	
Vanner et al. 2014	+	+	+		+		+	+	+
Rizos et al. 2015	+	+	+	+	+		+		+
Ritzén and Sandström 2017	+	+			+	+		+	
Agyemang et al. 2019	+	+	+		+		+	+	
De Jesus and Mendonça 2018	+	+	+		+				
Galvão et al. 2018	+	+	+	+					
Geng and Doberstein 2008	+		+		+				
Kirchherr et al. 2018	+	+		+	+				
Mahpour 2018	+		+	+	+		+		
Mangla et al. 2018	+	+		+	+	+	+		+
Masi et al. 2018	+	+	+		+			+	
Ranta et al. 2018				+	+				
Tura et al. 2019	+	+			+	+	+		
Kinnunen and Kaksonen 2019	+	+		+			+		+
Grafström and Aasma 2021	+	+	+		+				

Source: own compilation.

The listed categories of barriers correspond to the problems that emerge during the transition to the CE. The most common categories are technological, economic, institutional, and social. De Jesus and Mendonça (2018, p. 77) introduced an additional classification, dividing them into hard and soft barriers. Hard barriers are related to techno-economic issues, and soft ones are related to regulatory and social issues.

Although the neoclassical economy and circular economy represent different approaches to the market and its imperfections, there is a link between them. The barriers that occurred in the CE can be identified with classic market failures (see Figure 1). For example, with social barriers, community members' lack of (or limited) willingness to cooperate reduces or even prevents the creation of an effective CE value chain. This case can be attributed to the imperfect competition type of market failure. Society's limited awareness of public goods associated with the CE, i.e., the benefits of operating and developing the territory based on CE principles, falls into the category of market failure. Society's lack of awareness of the CE that results from gaps in their knowledge leads to market failures in the area of market incompleteness. An ineffective and inefficient system of information for citizens about the CE also does not favour the development of awareness, as manifested by market failures in information asymmetry. These barriers also promote the free rider effect, which is a market failure in the area of externalities. Thus, there is a clear connection between market failures and CE barriers. This was the starting point for our research. Individual categories of threats in classical market failures are also assigned to individual barriers in the CE (see Figure 1).

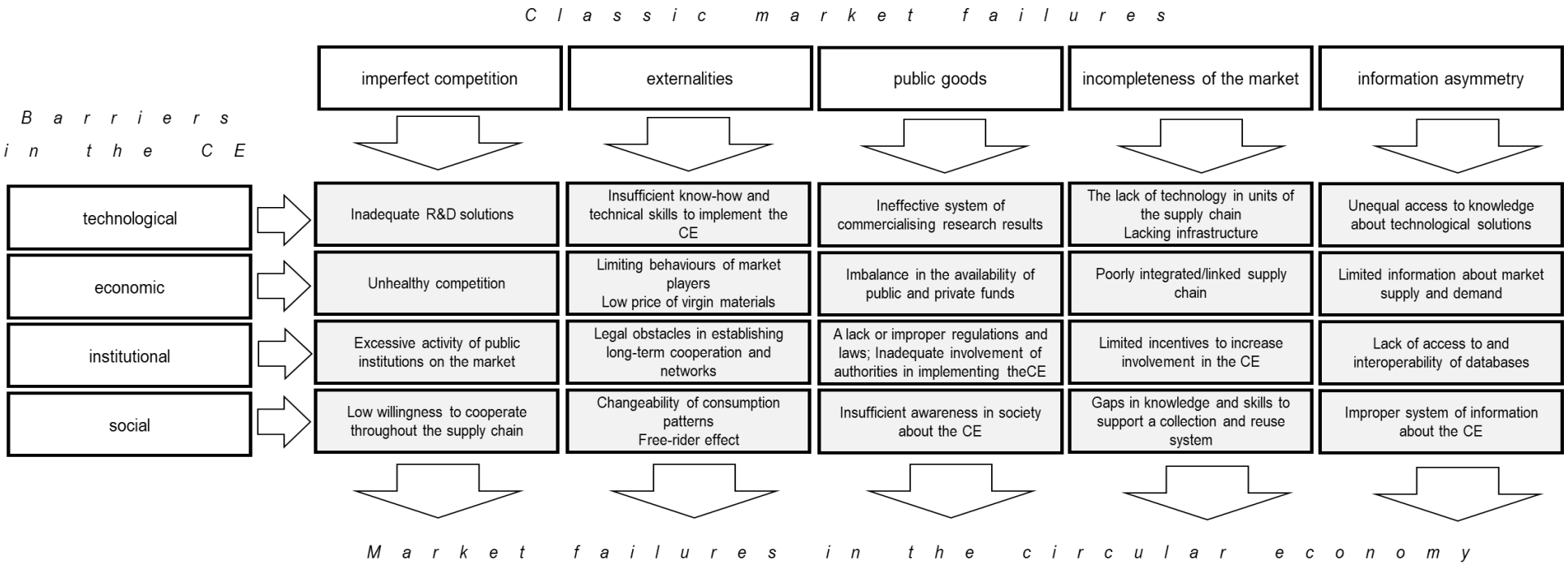


Figure 1. Categories and interpretation of market failures in the circular economy

Sources: own compilation based on Galvão et al. 2018, Grafström and Aasma 2021.

Materials and methods

The dynamics of change toward the CE vary depending on the maturity of a country's economy and communities. These differences are most noticeable between the countries of Western Europe and Central and Eastern Europe. Therefore, two purposefully selected regions were included in the study. The first, Friesland (the Netherlands), can be considered a reference point regarding the degree of advancement of the CE. It is becoming one of the most circular regions in Europe and should be treated as a template for other regions (Interreg Europe 2020). The second case study is the Lodz Region.

Friesland has approximately 650,000 inhabitants and covers an area of 5,748.77 km², divided into 18 municipalities. It is a regional authority and the governing body of one of the twelve provinces in the Netherlands. The capital and largest city is Leeuwarden. Economically, it is well known for its strong water and agriculture clusters and technology. In recent years, the main economic focus has been on transitioning towards a CE. Friesland strives to be the most circular EU region in 2025. Thus, the regional authority cooperates strongly in public-private partnerships with partners across the quarduple helix. On a European level, the region is a member of Association of Cities and Regions for Sustainable Resource Management (ACR+) (Circulair Friesland n.d.; Frontship n.d.; International Welcome Center North n.d.).

The Lodz Region is a regional self-governing administrative unit located in central Poland. It is inhabited by about 2.4 million people, and the seat of the local authorities is the city of Lodz. It is divided into 177 municipalities with an area of 18,218.95 km². Due to its central location in Poland and Europe, it has an excellent transport connection, and as a result, it has become a significant national and international logistics centre. For many years, the region has been striving to build its potential and become a bioeconomy leader in Poland and Central and Eastern Europe (e.g., innovative agriculture and food processing; medicine, pharmaceuticals, and cosmetics; green energy; the textile industry; biotechnology). The region has also taken significant steps toward actively participating in the EU's Circular Economy and wastes policy debates (Frontship n.d.; Województwo łódzkie n.d.). As the European Observation Network for Territorial Development and Cohesion (ESPON) report indicates, the implementation of CE solutions in the Lodz Region is at a fairly good level, as evidenced by indicators such as the national extraction of natural resources and waste generation (excluding major mineral waste) as a share of national material consumption. However, an indicator that should be improved is the turnover generated by CE companies (van Herwijnen et al. 2022). Challenges to CE implementation arise primarily at the local level and relate to closing circular value chains. It is also a challenge to monitor the implementation of CE measures at the local and regional levels, as well as the achievement of sustainable development goals.

This research aims to identify market failures that limit the implementation of the CE and to assess their level in the Lodz Region. The following research questions were posed:

Q1. Which market failures have the most significant negative impact on implementing the CE?

Q2. Are there differences in the level of market failures among the different stakeholder groups?

Q3. What are the reasons for market failures that limit the implementation of the CE?

Q4. What changes should be introduced to reduce market failures that limit the possibility of implementing the CE?

The research was conducted among four groups (business, government, academia, and society) that we consider to be the main actors in the market. Our choice is based on the quadruple helix model (Carayannis and Campbell 2009). For each group, we created matrixes to show the market failures from Figure 1 in detail.

To achieve this aim, we conducted two-stage research:

1. An online survey was conducted with people from each of the four groups (in total, there were eight surveys: four in Poland and four in the Netherlands). A separate survey was prepared for each group (4 in the English-language version and 4 in the Polish-language version). The selection of respondents was purposeful – they were specialists in the CE (academia, government and businesses) and local civic leaders (society), who then took part in an FGI, which was the second stage of our research. The respondents rated market failures on a five-point scale.
2. The results of the survey were the basis for the scenario and discussion during the FGI. An FGI was conducted with the same respondents (in total, there were 8 FGIs: four in Poland and four in the Netherlands).

The research involved:

- 20 government and local government members (10 in Poland and 10 in the Netherlands),
- 18 academics (10 in Poland and 8 in the Netherlands),
- 15 businesspeople (8 in Poland and 7 in the Netherlands),
- 18 members of society (10 in Poland and 8 in the Netherlands).

The research was conducted from April to September 2022. Gathering data let us compare the level of market failure in a region just beginning to implement the CE (i.e., the Lodz Region) with the template region (i.e., Friesland).

Results

The collected research material is presented in the form of matrices. The layout of the matrices was determined by the principles of CE market failures in Figure 1. The results of the survey formed the basis of the evaluations in the matrices for individual CE market actors, and they were verified during the FGIs. Thus, the occurrence of market failures in both regions and the disproportions between them were determined.

Market failure in the CE from the business perspective

The surveys conducted among companies indicated that the most noticeable market failure in the Lodz Region was public goods (with a rating of 5.0, Figure 2). The least noticeable problem was information asymmetry (3.3, Figure 2), which also saw the smallest gap between the two regions.

Business owners from the Lodz Region stated that the biggest problem was the existing legislation and how it was interpreted and applied by public institutions (PG). One respondent spoke of "beating their head against a wall due to legislative absurdities". According to the respondents, public entities are favoured during tenders, making it difficult for private entities to compete with them. Another problem was regulations that obstruct the treatment of waste as a secondary raw material (PG). Additionally, the highly formalised procedures mean that a lot of time must be spent dealing with official matters.

It was often mentioned that there is "collusion among companies" when they participate in public procurement tenders (IC). As a result, a given market may be serviced by only one or two enterprises, which creates barriers to other entities from entering the sector. There is a lobby of current business owners that blocks other entities from entering the market. The other barrier to entering the market is the high costs of technology, which are demanded in, e.g., the secondary raw materials sector (IM).

The interviewees indicated that the cost-effectiveness of using secondary raw materials depends on the type. Firstly, virgin materials with simple ingredients are cheaper than secondary raw materials. Secondly, the availability of secondary raw materials with more complicated ingredients is limited (EX). The business owners noticed that nowadays, it is impossible to act without cooperation. Of course, such cooperation should be beneficial for partners and primarily involves the exchange of benefits, including information. One company owner said, "If there is business to be done, we cooperate." However, someone else said, "We cooperate, but do not share knowledge and experience." The business owners from the Lodz Region stated that incomplete and unreliable databases are not conducive to networking and cooperation (IA). It is difficult to establish needs and monitor what other companies that could enter cooperation are

doing and what raw materials they have. Underreported information in databases contributes to further difficulties in planning the volume of waste, which does not always have much to do with reality. For example, waste processing installations may only be created as indicated in the plan, which may be insufficient.

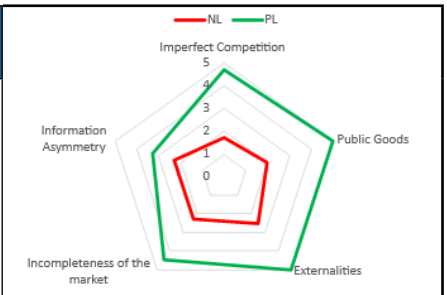
Market participant:	BUSINESS	
Characteristics of the FGI research target group:	Companies from Circular Systematic Solutions (CSSs): wood, plastic, water, food and other companies involved in the CE (i.e., waste collection and recycling)	
TYPE OF MARKET FAILURES	**MAJOR INTERPRETATION OF MARKET FAILURE IN THE CE**	**SYNTHETIC ASSESSMENT OF MARKET FAILURE OCCURRENCE**
Imperfect Competition [IC]	– number of entities on the market – type of relationship between market players (openness to cooperate) – the activity of public institutions in the market	PL 4.3 NL 1.7
Public Goods [PG]	– evaluation of the regulations related to the activities of secondary raw materials market operators	PL 5.0 NL 2.0
Externalities [EX]	– consumption patterns – cost-effectiveness of using secondary raw materials	PL 4.5 NL 2.5
The incompleteness of the market [IM]	– number of secondary raw material suppliers on the market – availability of secondary raw materials on the market – the complexity of the value chain – entry barriers to the market	PL 4.3 NL 2.3
Information Asymmetry [IA]	– utilities of data on the secondary raw materials market – access to information on new techniques and technologies – the willingness of / secondary raw material market actors to share knowledge and information	PL 3.3 NL 2.3

Figure 2. Market failures matrix – companies

Source: own compilation.

The situation seems better for companies in Friesland. First of all, there are accelerators to help small and medium-sized enterprises that operate within the CE framework stay in business. Although operating in the CE market "is not cheaper, it is easier to get public funding." The business owners noticed that networking (formal and informal), especially in the region or even on a smaller scale, is important in the way their entities function and develop. Each company belongs to several associations and transparent

platforms, which helps them to exchange information and contacts (IC). There is a high level of knowledge exchange and knowledge sharing among competitors (IA). In the respondents' opinion, financial or non-financial profit does not have to be visible immediately; such an attitude brings long-term benefits. The business owners pointed to a noticeable barrier to entering the secondary raw materials market, i.e., incomplete information on raw materials (e.g., quantity, availability, or quality at a specific time).

Market failure in the CE from the academic perspective

Academics in the Lodz Region identified externalities and incompleteness of the market as the most common market failures (3.5 and 3.3, respectively, Figure 3). Imperfect competition was considered the least problematic (2.3, Figure 3). Importantly, in this research group, the results in both regions were the least divergent.

The respondents from the Lodz Region indicated that CE themes are very popular and topical, and that undertaking research in this area guarantees cooperation between R&D institutions and enterprises (IC). They also stated that it is easy to obtain funding (grants) for research in the field of CE or to publish an article on this topic. According to the respondents, CE research requires interdisciplinarity, which necessitates cooperation, both between researchers from different academic fields but also with business owners and members of local governments. While cooperation with private entities was rated quite high, cooperation with local governments was rated low (it often finished at discussions and plans). Waiting for offers of cooperation was considered a weakness of the academic units, which rarely initiate R&D cooperation on their own (EX). Other problems faced by academic institutions in the Lodz Region are the lack of interdisciplinarity in CE research and the fact that researchers specialise in narrow research fields (IC). Knowledge transfer was also considered an important element in CE research, as exchanging knowledge, data, and information increases the chances of finding and implementing new measures. Unfortunately, its effectiveness was not rated highly (EX).

The Friesland researchers also mentioned the interdisciplinarity of CE research. They also considered themselves to be interdisciplinary and saw their strength in this, as this feature makes them an attractive partner for businesses (IC). In addition, their attractiveness for business is strengthened by their extensive networks of formal and informal contacts. One effect of these contacts is the temporary transfer of academics into the business sector. According to the researchers, the essence of the CE is to identify CE challenges, not only technological ones, but also those of a social, managerial or economic nature (again, interdisciplinarity is important). Knowledge transfer, which creates cooperation networks and allows the exchange of data and information, was also considered important (EX). In contrast to the Lodz Region, cooperation with the local government was assessed positively. In Friesland, local and regional governments are much more active;

they play the role of facilitator and indicate and encourage involvement in CE projects (IM). Importantly, the academics try to meet the needs of the local government and local business owners in both research and teaching activities (IA).

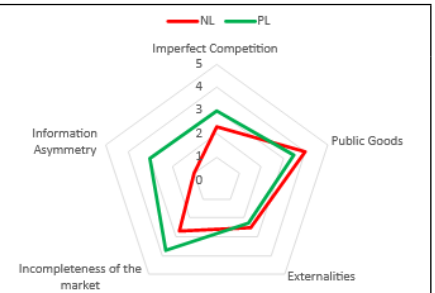
Market participant:	ACADEMIA	
Characteristics of the FGI research target group:	Academics involved in researching the CE in terms of the CSS scope Administrative officer of R&D units in terms of the CSS scope	
TYPE OF MARKET FAILURES	**MAJOR INTERPRETATION OF MARKET FAILURE IN THE CE**	**SYNTHETIC ASSESSMENT OF MARKET FAILURE OCCURRENCE**
Imperfect Competition [IC]	– competitiveness assessment of CE research – participation in CE projects in the activities of the R&D units – attractiveness of R&D units for business	PL 2.3 NL 2.0
Public Goods [PG]	– public funds crowding out private finance – the scope for commercialising research from public funds	PL 3.0 NL 3.5
Externalities [EX]	– formal barriers to commercialisation – CE projects carried out in partnerships vs individual projects – synergy effects of partnership – effectiveness of knowledge and technology transfer – profitability of CE projects – staff transfer	PL 3.5 NL 2.0
The incompleteness of the market [IM]	– implementation possibilities of projects – the level of interest and absorption of the proposed solutions in the regional market – absorption of R&D projects related to the CE in the region	PL 3.3 NL 2.3
Information Asymmetry [IA]	– monitoring market needs – monitoring business partners	PL 3.0 NL 1.0

Figure 3. Market failures matrix – academia

Source: own compilation.

Market failure in the CE from the society perspective

A study among members of society showed that in the Lodz Region, the key market failures were incompleteness of the market and information asymmetry (both scored 4.0, Figure 4). Externalities were the least problematic (2.7). The smallest gap between the two regions was noticed in this area.

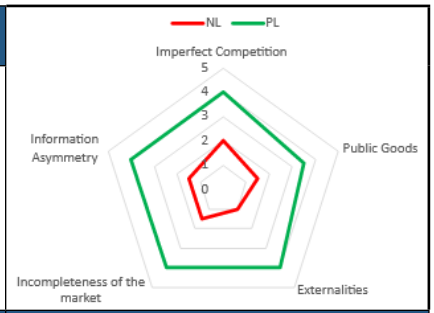
Market participant:	SOCIETY	
Characteristics of the FGI research target group:	– members of NGOs – members of the social enterprise – local social leaders	
TYPE OF MARKET FAILURES	**MAJOR INTERPRETATION OF MARKET FAILURE IN THE CE**	**SYNTHETIC ASSESSMENT OF MARKET FAILURE OCCURRENCE**
Imperfect Competition	– awareness of being a link in the value chain of industrial symbiosis – cooperation between residents in the CE	PL 3.5 NL 1.5
Public Goods	– the social responsibility of residents as producers of waste – evaluation of regulations on the collection and use of waste	PL 3.5 NL 1.5
Externalities	– benefits of participating in a recycling management system – willingness to buy goods made from secondary raw materials – free-rider effect – gaps in the system of motivation and control of waste management	PL 2.7 NL 1.7
The incompleteness of the market	– the incompleteness of municipal recycling collection infrastructure – gaps in the involvement of residents in waste management processes	PL 4.0 NL 1.5
Information Asymmetry	– completeness of information on the waste collection system – completeness of information on the waste reuse system	PL 4.0 NL 1.5

Figure 4. Market failures matrix – society

Source: own compilation.

Citizens in the Lodz Region are mostly aware that they are part of a supply chain and are often and eagerly involved in additional ecological initiatives (including Earth Day, Cleaning the World, and collecting bottle caps and paper). They evaluated themselves as aware consumers (IC). The major factors that influence their attitude are children and their future. On the other hand, the respondents stated that they do not have

complete knowledge regarding the CE, e.g., how to segregate waste. They also indicated that the behaviour of neighbours who do not care about the environment can be demotivating. They expressed concern that anonymity in crowded places (especially in a block of flats) exempts some residents from being responsible and complying with the rules (EX). According to one respondent, "An attitude persists in a large part of society: Why make an effort if others don't do it anyway?" A lack of information about the benefits of participating in waste segregation and recycling, as well as incomplete information about it (e.g., collection dates and location), was also noted (IA).

Frisian society is very dutiful when it comes to waste management issues (PG). Awareness of the need to take care of the environment, which includes sorting waste, is something that the Dutch "suck from their mother's milk" (IC). Their awareness translates into openness and involvement in CE initiatives and activities proposed by public authorities or NGOs. Especially among the younger generations, it is popular to use second-hand products (e.g., clothes and furniture) bought in shops or online (EX). Older people, on the other hand, are more involved in socio-educational activities, in which they try to share their knowledge and experiences of pro-environmental attitudes. This is important because, according to the survey, "people think that using secondary raw materials results in a higher price for the products made from them". This has often been true, but it will certainly change in the long term.

Market failure in the CE from the government perspective

From the perspective of the region and local government, the research found that in the Lodz Region, key market failures were externalities (5.0, Figure 5). The least problematic areas were imperfect competition and incompleteness of the market (3.2 and 3.3, respectively). In these cases, the smallest gap between the two regions was noticed.

Members of the Friesland authorities see themselves as a booster for the functioning and development of the CE in the region (PG), encouraging business owners to be more circular. They are also a key link between the different actors in the CE market, creating a network and a platform for cooperation (IC). For example, the Circular Friesland Association and other dedicated information and education platforms were established to serve this purpose. In addition, the local government works to ensure that the green procurement system contributes as much as possible to the circular value chain (EX). The authorities identified more difficult and less precise regulations defining company waste as a problem (PG), although they also stated that high awareness in society can sometimes be a problem. As an example, they cited a decrease in the number of domestic tourists who chose not to stay in certain types of accommodation due to the lack of waste segregation. The regulations on the no of waste segregation in tourist accommodation are due to insufficient knowledge of the segregation rules among some tourists. An important element in creating a CE in the region

is institutions that support the creation and development of circular businesses (IM). An example is BeStart, a startup accelerator that helps circular startups in the north of the Netherlands become successful.

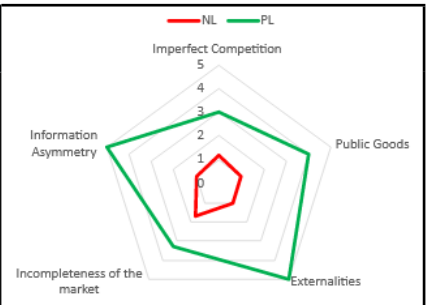
Market participant:	GOVERNMENT	
Characteristics of the FGI research target group:	– Members of the provincial and local government involved in planning, implementing and managing the CE – Members of an institution that supports and controls CE processes in the province	
TYPE OF MARKET FAILURES	**MAJOR INTERPRETATION OF MARKET FAILURE IN THE CE**	**SYNTHETIC ASSESSMENT OF MARKET FAILURE OCCURRENCE**
Imperfect Competition [IC]	– number of operators in the municipal and industrial waste market – competitiveness of public enterprises – type of relationship between market players (openness to cooperate) – public compliance with current waste management rules – society's openness to new CE solutions	PL 3.2 NL 1.2
Public Goods [PG]	– the authorities' role in the market – the authorities' flexibility in decision-making – evaluating laws and regulations on the market of secondary raw materials	PL 4.0 NL 1.3
Externalities [EX]	– the authorities support entering and existing market players – market players' behaviour as a market barrier – the impact of existing regulations on establishing long-term cooperation and networks	PL 5.0 NL 1.0
The incompleteness of the market [IM]	– number and type of market actors vs meeting their needs – adequacy of R&D solutions on the market (e.g., availability) – the possibility of greater citizen participation in the market	PL 3.3 NL 1.3
Information Asymmetry [IA]	– the willingness of secondary raw material market actors to share knowledge and information – database interoperability	PL 4.5 NL 1.0

Figure 5. Market failures matrix – government

Source: own compilation.

Members of the public authorities from the Lodz Region pointed to the problem of inadequate regulations governing the control of waste flows, which has resulted in the so-called

"Polish-utilisation", i.e., abandoning waste in warehouses, illegally burning it or dumping it in mine pits (IC/PG). In addition, the respondents pointed to the poor quality, inaccessibility and lack of interoperability of databases (IA). For this reason, it is difficult for the public authorities to produce planning and strategic documents that meet real needs. An insufficient number of well-qualified staff in public institutions who deal with the CE is also a problem. According to the respondents, the creation of a CE system is not facilitated by the fact that there is a monopoly of waste management actors who are not open to sharing knowledge or information with others. The cooperation between public authorities and R&D entities is also noteworthy (IC/IA). The authorities lack funding to subsidise CE research, and they suggest that academia needs to be opened up to local governments and other public institutions (IM).

Discussion and conclusions

Based on the research, in the vast majority of cases, Friesland performed better than the Lodz Region, with the Dutch members of the public and local government evaluating the market failures close to the optimum (i.e., the ratings were close to 1).

Referring to research question 1, it can be concluded that the Lodz Region is only at the beginning of building a CE, so all types of market failures were identified, and they occur at a similar level. The most significant market failures were externalities and public goods (see Figure 6). What this means is that inadequate laws (PG) and immature cooperation (EX) are the region's weaknesses. The legal weaknesses are due to their high variability and lack of precision, which allows for a great deal of arbitrary interpretation. Regarding cooperation, if it does occur, it tends to be traditional and forced rather than the result of a well-thought-out strategy based on the benefits for the market actors. As observed in Friesland, networking is crucial for the construction and effective functioning of a CE.

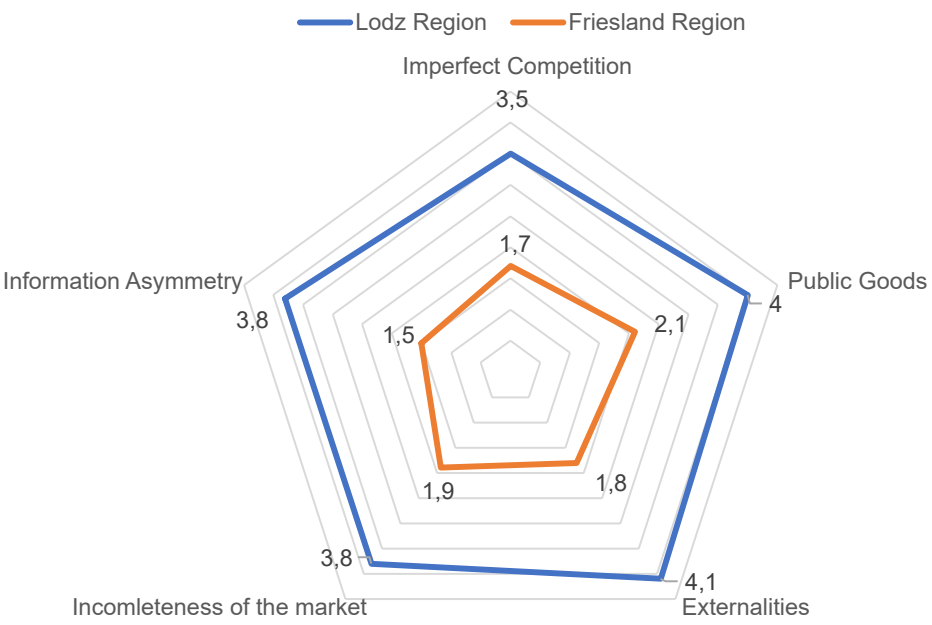


Figure 6. Level of CE market failures in the researched regions

Source: own compilation.

Regarding research question 2, there were clear differences in how the groups assessed market failures, although they are not very significant. The group of business owners gave the highest ratings, while the academics gave the lowest ratings (Tab. 2).

Table 2. Compilation of market failures by research group

Research group	NL	PL
Company	2.16	4.28
Academics	2.16	3.02
Society	1.54	3.54
Government	1.16	4.00
Regional average	1.76	3.71

Source: own compilation.

These differences are mainly due to the different roles assigned to each market actor and the resulting level of market activity. Business owners comprise the group that creates the foundations of the market, and they are the most active participants in it, which is why they see the most market failures. At the same time, they are most exposed to them every day from all other market actors, and they are the least protected from the effects of market failures.

On the other hand, the academics showed minor activity in the market, focusing primarily on their research and teaching activities. However, it does not necessarily mean

that this activity is the least important. Additionally, academics face unfair competition at the regional level.

Concerning research question 3, in the Lodz Region, the high occurrence of market failures is primarily due to the stage that the economy is currently at, i.e., transitioning from a traditional economy to a circular one. The main market failures that limit the possibilities or slow down this process include the following:

- regulations that do not encourage and even discourage potential actors from implementing CE rules (PG);
- low awareness of potential actors in the CE market, especially members of the public/residents of the region (IC/PG). However, it should be remembered that changes in awareness take time and awareness-raising activities, and the effects are sometimes visible with a generational change;
- the lack of awareness and developed solutions for cooperating with other actors in the CE market results in a network of limited connections to ensure effective and globally beneficial cooperation (IC/EX).

In order to limit market failures and their effects on the CE market, multidimensional and consistent changes are necessary (research question 4). There should be a comprehensive process and not a set of disconnected, incidental activities. As part of this process, the following elements of the CE development support system should be prepared and implemented:

- an effective system of legal regulations and institutional solutions to encourage potential actors to take the right actions and punish them for breaking the rules (it will reduce the level in the scope of PG/EX market failure);
- a set of good practices linked to a system of cooperation within and between different categories of CE market actors (it will reduce the level in the scope of IC/IM market failure);
- a system for monitoring emerging market failures (it will reduce the level in the scope of IA market failure);
- an education system that continuously increases the awareness of all participants of the CE market (it will reduce the level in the scope of IC/EX market failure).

The main actor that should take charge of developing the above measures is the public authorities. It should be done at the local or regional level, as well as at the central level, since the legal regulations and the system of incentives are primarily the competence of the central level (it will reduce the level in the scope of PG market failure).

In Friesland, the low occurrence of market failures is a result of the awareness of all researched groups. Awareness of the need to move towards a CE is deeply rooted in the culture, education system and upbringing in the Netherlands. The awareness of society (understood as residents, business owners, academics and members of local and regional authorities or civil servants), which has built up over many years, led to the creation of high-quality social capital. Naturally, this social capital additionally enhances people's awareness, so it is a self-reinforcing process. The result of this capital and awareness is a mutual trust that fosters commitment to networking and building the CE. Networking is a key factor in Friesland's success in building a CE. If the Lodz Region is to increase its circularity, it could benefit from the experiences and solutions of the Friesland Region.

Many economists believe that it is not necessary to correct market failures because free markets correct themselves over time. However, there are many methods to reduce market failures, for example, laws and regulations, taxes, subsidies and trade restrictions. Amending market failures seems to be required in a CE. To achieve the United Nations' 2030 sustainable development goals, we must strive for the rapid implementation of the CE. It is, therefore, necessary to support its implementation by eliminating market failures. What makes the CE unique is that it is primarily based on awareness, networking, and the integrated cooperation of all market actors. Therefore, action is needed to make stakeholders change and start implementing a CE. Such actions might include education to boost awareness and incentives that trigger market actors' involvement in the CE. This involvement should not be limited to being a passive recipient. It should ultimately manifest itself in active participation, e.g., through prosumerism and/or being part of industrial symbiosis.

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Zagubieni w okresie przejściowym? Zawodności rynku we wdrażaniu gospodarki cyrkularnej. Analiza porównawcza Niderlandów i Polski

Obecnie transformacja gospodarek w kierunku obiegu zamkniętego i cyrkularności jest koniecznością. Tym, co szczególnie hamuje wdrażanie gospodarki cyrkularnej w gospodarkach liniowych, są zawodności rynku. Teoretyczne podstawy zawodności rynku są zakorzenione we współczesnej ekonomii dobrobytu i ekonomii neoklasycznej. Zawodności wpływają na funkcjonowanie różnych obszarów rynku, w tym alokację i dostęp do zasobów, konkurencję oraz współpracę między podmiotami. Zawodności rynku ograniczają również możliwość wdrożenia symbiozy przemysłowej opartej na międzysektorowej współpracy i tworzeniu efektywnych systemów produkcji. Jest to istotne, ponieważ funkcjonowanie lokalnych podmiotów w ramach symbiozy przemysłowej znacząco sprzyja promocji i wdrażaniu gospodarki cyrkularnej. Celem artykułu jest identyfikacja zawodności rynku ograniczających wdrożenie gospodarki cyrkularnej w tradycyjnych gospodarkach liniowych. Artykuł powstawał na podstawie zogniskowanych wywiadów grupowych (FGI) przeprowadzonych z reprezentantami czterech grup interesariuszy w Niderlandach i Polsce: środowiskiem akademickim, społeczeństwem, przedsiębiorcami oraz władzami. Przeprowadzone badania wykazały, że jedną z największych barier wdrażania gospodarki cyrkularnej w Polsce jest niska świadomość interesariuszy na jej temat. Wpływa to na ich możliwości współpracy i networkingu. Obowiązujące w Polsce przepisy prawne dodatkowo ograniczają możliwości rozwoju gospodarki cyrkularnej. Inaczej wygląda sytuacja w Niderlandach, gdzie – jak pokazały przeprowadzone badania – świadomość na temat gospodarki cyrkularnej jest głęboko zakorzeniona w kulturze, systemie edukacji i wychowaniu. Skutkuje to niższym poziomem występowania zawodności rynkowych.

Słowa kluczowe: gospodarka cyrkularna, gospodarka liniowa, tranzycja w kierunku gospodarki cyrkularnej, zawodności rynku