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## Institutionalising the circular economy in regional strategies in Poland: An adaptive governance approach

**Abstract:** A new concept charting a new direction for regional socio-economic development in the early 2020s is the circular economy (CE). The novelty means that there is no empirically verified methodology for implementation, and therefore, the extent and scope of incorporating CE into regional declarations and actions will vary. For regions, structured activities should follow the adopted development strategy. Therefore, based on an analysis of the invocation of the CE concept in elements of the strategic management model, included in the regional development strategy (2018–2021), it is possible to determine the degree of its structuring. For this purpose, content analysis and correlation analysis were used. The study aims to explain differences in the institutionalisation of CE in voivodeship development strategies in Poland. The article hypothesises that a high level of CE structuring is correlated with its definition in the strategy and also the state of the environment in the region, and explains the variation in CE institutionalisation using adaptive governance theory. We conclude, based on the results, that regions with higher environmental pollution use CE in more detail in regional development strategies.

**Keywords:** circular economy; development strategy; institutionalization; NUTS-2; regional strategy; regions; voivodeship

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## INTRODUCTION

The transition to a circular economy (CE) is one of the key challenges facing Europe today. The European Commission, through initiatives such as the European Green Deal, promotes this concept at the regional level among member states. However, despite growing interest in CE, regional approaches to its implementation vary due to environmental, economic and social considerations. Previous research suggests that CE has the potential to enhance

economic resilience, create jobs and promote global sustainability (Abad-Segura et al., 2020; Busu, Trica, 2019; Chennak et al., 2023; Hysa et al., 2020). Nonetheless, the adoption of CE varies across EU member states and regions.

This article analyses the variation in the institutionalization process of CE within the regional development strategies of Polish voivodeships while the research examines the correlation between different elements in the strategies and CE institutionalization, and tests hypotheses regarding the influence of environmental pollution on the adoption of CE.

The first part of the article presents a literature review on CE implementation at a regional level, focusing on the institutional framework outlined in voivodeship development strategy documents. Subsequently, we discuss the methodology employed to study CE institutionalization in regional strategy documents.

The following section presents the results of the analysis of CE institutionalization on the regional development strategies of 17 Polish voivodeships (NUTS2 level) and also verifies three research hypotheses related to CE institutionalisation in Polish regional strategies and its correlation with environmental pollution.

The article concludes by discussing future research directions concerning CE institutionalisation within regions, considering the limitations and potential of analysing regional development strategies as a research tool.

## LITERATURE REVIEW. CIRCULAR ECONOMY TRANSITION AT THE REGIONAL LEVEL

The ambition to move towards a circular economy in the regions is an observable trend (Petit-Boix, Leipold, 2018), combined with a regional response to environmental degradation and natural resource constraints. China and the EU are pioneers in the implementation of CE (Cramer, 2022; Geng et al., 2009; Reike et al., 2018). This development direction has become common practice in EU countries through the European Green Deal (COM, 2023), especially the 'EU Circular Economy Action Plan (CEAP)'. CEAP pressures the European linear economy to transition into a circular economy at national, regional and local levels (Sileryte et al., 2020), evidenced by the national, regional or urban dimension characteristic of more than 50% of CE implementations being put into economic practice (Mhatre et al., 2021). The EU's emphasis on CE adoption is also present in Poland and its administrative regions which justifies CE implementation in the voivodeships (regional administration NUTS-2 level) as the choice of research area.

A circular economy includes recycling, reuse and waste reduction, minimising environmental impact, and supporting economic and social harmony for present and future generations (Alizadeh et al., 2023). Its focus on sustainable energy and holistic solutions related to agriculture, water, soil and biodiversity, and is key to fostering economic resilience, competitiveness, job creation and global sustainability (Chennak et al., 2023).

Such a change occurs at three levels (Kirchherr et al., 2017): macro- encompassing global and national change (Cramer, 2022; Ferronato et al., 2019; Geng et al., 2009; Su et al., 2013); meso – focusing on regions and network organisations (Christensen et al., 2022; Sani et al., 2021; Vanhamäki et al., 2020; Yalçın, Foxon, 2021) and micro- i.e. the enterprise-consumer area (Borusiak et al., 2021; Gackstatter, Goehlich, 2022; Stucki et al., 2023; Valls-Val et al., 2022). The above division makes it difficult to systematise the

research and monitoring of CE transitions in different economic areas where the three dimensions intersect. Some researchers locate regional and urban economic change at the macro level (Merli et al., 2018) and the literature review confirms this observation. Publications with the keywords 'regions and CE' include works on resource management in cities (Koop, van Leeuwen, 2017; Obersteg et al., 2019; Petit-Boix, Leipold, 2018), urban areas (Anttiroiko, 2023; Zeller et al., 2019), sub-regions (Lisjak et al., 2017) and, less frequently, refer to administrative regions (Avdiushchenko, 2018; Cramer, 2020, 2022). The lack of clarity in the systematisation of CE implementation may be due to differences in administrative divisions between European countries. In Poland the division (into voivodeships) is very clearly defined at the territorial level with assigned administrative competencies.

CE is developing well in cities and industrial districts (Niang et al., 2023), but not in all. Although structural characteristics, such as the availability of waste management infrastructure or the concentration of stakeholders in circular solutions, are important in the implementation of CE, at the regional level, policies and governance approaches implemented are also crucial (Kinnunen et al., 2021; Kruse, Wedemeier, 2023). Policy instruments alone cannot initiate an economic symbiosis with CE in a region (Mattiussi et al., 2014; Van Beers et al., 2007), it is necessary to integrate bottom-up and top-down approaches, as well as to foster a high level of public involvement (Ashton, 2008; Avdiushchenko, 2018; Chertow et al., 2008; Smol et al., 2018) and to establish clear short- and long-term goals with a monitoring system (Smol et al., 2018; Winans et al., 2017). The transformation to CE depends on the cooperation of all circular policy actors and the creation of patterns of synergy (Ghisellini et al., 2016), the involvement of stakeholders (Cader et al., 2023) and the level of knowledge of a region's inhabitants (Smol et al., 2018).

The way CE is understood in areas of transition is often limited. In EU countries and regions, it is seen as being strongly linked to the topics of waste management (Vanhamaki et al., 2019) and recycling (Mhatre et al., 2021). Its limited relevance may be due to the continuous evolution of its definition (Vanhamäki et al., 2020) and numerous indirect socio-economic factors on the development of regions and CE, such as education (Duong et al., 2022), culture, spatial planning (Avdiushchenko, 2018) and innovation (Smol et al., 2017; Szczygieł, Śliwa, 2023).

With CE becoming a European necessity at macro, meso, and micro levels, researchers point out the gaps that exist between policy makers and research. Emphasis is placed on the need to model the transition to CE at the regional level (Avdiushchenko, 2018; Meglin et al., 2022), to develop indicators that take into account the socio-economic characteristics of a region (Agovino et al., 2019; Cader et al., 2023) and to consistently collect figures on the progress of this transition (Modoi, Mihai, 2022). A description of the course of CE implementation at the regional level (NUTS 2) requires more research interest (Kruse, Wedemeier, 2023). It should include institutionalisation mechanisms for macro and city levels (Christensen et al., 2022; Ranta et al., 2020) and should be extended to the regional level. The analysis presented here fits into this thematic strand. The study deals with regions with clear administrative and territorial competencies and thus extends the commonly developed results for cities; and at the macro scale, the country. It covers the diversity of CE occurrence in the tasks of administrative entities and fills a defined research gap in CE institutionalisation in politics.

## REGIONAL DEVELOPMENT STRATEGIES AND IMPLEMENTATION FRAMEWORKS FOR CIRCULAR ECONOMY

Regional self-government is the primary actor in the programming and implementation of the Polish state's intra-regional policy. The applicable formal conditions for creating and implementing regional development strategies are a consequence of adaptation to external conditions. In particular, this concerns the necessity of adapting the assumptions of public policies, including regional policy, to the standards of the European Community, particularly EU Cohesion Policy (Dymek, 2020; Sabal, 2023). Currently, the assumptions of regional development policy are a consequence of the adaptation of Polish law to EU rules in the 2007–2013 programming period, followed by an evolutionary adaptation in subsequent programming periods (Churski, 2023). The act's provisions condition regional government's actions on the National Development Plan (of 20 April 2004) and voivodeship development strategies. This strategy is a formal document, the content of which, in the case of Polish regional government, is regulated by law (Ustawa, 2022 art. 11).

The law regulates the objectives that must be included in the strategy and defines, in paragraph 2 of Article 11, the necessary elements of a voivodeship development strategy: diagnosis of the current state of the voivodeship, a vision of the region's development, strategic and operational objectives, areas of voivodeship activity including areas of strategic intervention, a model of the voivodeship's functional and spatial structure, indicators for the strategy's implementation, a forecast for the impact of the strategy on the environment, and its implementation and financing framework. In addition, based on the accepted practice of creating such documents, two additional elements were identified, i.e. stakeholders and the development vision. Altogether, these elements constitute the subject for the analysis of the implementation of the CE concept in voivodeship development strategies.

There is no universal template for a regional development strategy. However, as Stimson et al. (2006) identified, some distinctive elements of a regional development strategy are strategic intent, planning context, strategic directions and strategic 'architecture'. By considering the key elements of a regional development strategy and the results of the literature review describing elements of a regional strategy development model, it is possible to operationalise them and provide a theoretical framework (Table 1).

Strategic intent encompasses the main assumptions, expected outcomes and organisation for both the plan and the implementation management framework. Prahalad and Hamel (1994) state that strategic intent conveys a sense of direction while Lovas and Ghoshal (2000) describe it as an indication of long-term goals. Rui and Yip (2008) interpret it as the continuous pursuit of long-term goals, a source of motivation and an active and rational process of resource concentration. The voivodeship regional development strategy includes these elements in its strategic and operational objectives.

The planning context refers to the factors that influence the planning process, requiring careful consideration of the situation, goals, objectives and available resources (Arterton, 2023). The planning context includes a diagnosis of the region's current situation, including its organisation and competitive position.

Strategic directions should describe the main paths for implementing the plan and identify future key drivers of economic development (i.e. key industries, clusters and markets for growth). These set the framework for future pro-development activities within a voivodeship. Strategic direction is a vision of the organisation's position in the

future (Tipurić, 2022). For public sector entities, it is particularly important to align the organisation’s activities with external stakeholders and available funding sources (Poister, Streib, 1999).

Strategic ‘architecture’ is a key element in creating, formulating and evaluating strategy (Fuertes et al., 2020). It addresses internal factors relevant to its success, integrating all the main activities in order to achieve the organisation’s strategic agenda, focusing on long-term viability and effectiveness (Poister, Streib, 1999).

*Table 1.* The theoretical framework of a regional development strategy

Core parts of the strategy	Elements of a regional development strategy	Sources
I. strategic intent	1. strategic objectives 2. operational objectives	(Lovas, Ghoshal, 2000; Prahalad, Hamel, 1994; Rui, Yip, 2008; Ustawa, 2022)
II. planning context	3. diagnosis 4. implementation indicators for strategic and operational objectives 5. model of the functional and spatial structure of the voivodeship 6. areas of strategic intervention 7. voivodeship activity areas	(Arterton, 2023; Ustawa, 2022)
III. strategic direction	8. vision for the development of the region 9. stakeholders	(Tipurić, 2022; Ustawa, 2022)
IV. strategic architecture	10. environmental impact assessment 11. strategy implementation system 12. funding	(Fuertes et al., 2020; Poister, Streib, 1999; Ustawa, 2022)

Source: own elaboration

## HYPOTHESIS DEVELOPMENT

The scope of embedding the concept into a strategic action plan refers to incorporating it within a strategic document. This process of concept alignment can also be referred to as institutionalisation, formalisation, structuration or strategising. This last involves a systematic and structured approach to transforming a concept or vision into a tangible and successful outcome, leveraging strategic thinking, planning and execution. It reflects perceptions and assumptions about the importance of a given concept guided by a diagnosis of the socio-economic environment. This analysis determines the scope and feasibility of implementing the concept within the regional context.

Building on this proposition, we adhere to the theoretical framework of adaptive governance which recognizes the intrinsic coupling of human and natural systems (Clever, Whaley, 2018). This new theoretical approach explains how resilience and sustainability are created using a socio-ecological system (Vandergert et al., 2016; Wilkinson, 2012). Adaptive governance theory treats social and ecological systems as interconnected entities, facilitating the examination of a governance system’s capacity to adapt to new ecological and social conditions (Partelow et al., 2020). From this perspective, the nexus between circular economy (CE) strategic alignment and the characteristics of the regional socio-economic environment becomes enriched. The essence of strategising a concept relates to institutionalisation, as discussed earlier and it refers to adaptive capacity (Folke et al., 2005), which regional governments should consider as a determinant of adapting

new policy concepts such as the circular economy. The study aims to explain the differences in the institutionalisation of CE in voivodeship development strategies in Poland.

The state of the environment can be represented in different ways. In Kukuła's (2019) study, environmental pollution represents devastated and degraded land requiring reclamation, water consumption, industrial and municipal sewage, dust emission, gas emission and waste. These variables allow the determination of a regional ranking due to the degree of environmental pollution. At the same time, as Kukuła suggests, this should induce a region's authorities to take appropriate pro-environmental measures, the implementation of which is identified in the development strategies. Following Kukuła, we formulate the three main hypotheses as follows:

- H1: The level of institutionalisation of CE in regional strategies is related to high environmental pollution in those regions
- H2: CE is more precisely defined in regions of high environmental pollution
- H3: The high level of institutionalisation of the CE concept is correlated with how advanced a regions' definition is

## RESEARCH METHOD

The research material consisted of 16 regional strategies officially adopted by regional authorities in 2020–2021, with the exception of the Śląskie Voivodeship in 2018 and the Zachodniopomorskie Voivodeship in 2019 (Annex 1). Each strategy was, on average, 131 pages long. The research material was downloaded from the Public Information Bulletin, where the voivodeships must make such information available.

Content analysis using the regional development strategy model (Table 1) was applied to conduct the study. This allows categories to be assigned to individual phrases in the text (Stemler, 2001) and their quantitative systematisation, determining the frequency of keywords in the analysed transcript (Mays et al., 2005). In all strategies, keywords corresponding in Polish to the phrases "circular economy", "closed-loop economy", "CE" and "circularity" were searched for. Text fragments were then coded, and the search was extended to include words synonymous with CE used in the strategies and the marked fragments were subjected to thematic coding according to the extracted elements of the strategy model. A single mention of CE was sufficient to recognise the occurrence of the concept in an analysed part of the strategy. A mention of CE or a semantically similar word was coded as 1; no mention as 0. The two researchers coded the data separately. In the next step, the results were compared and reconciled which resulted in a summary of the degree of institutionalisation of the concept of CE – the proportion of parts of the strategy that mentioned CE relative to all parts of the strategy. These results were cross-referenced with voivodeship ranking in terms of environmental pollution as established by Kukuła (2019); the resulting coding and ranking database can be found in Annex 2. Testing for correlation between the data sets was conducted using Pearson's  $r$  and Kendall's tau coefficients, non-parametric significance tests chosen due to the small study sample and the ordinal scales used. The STATISTICA programme was used for the calculations.

## STRATEGIES AND CE INSTITUTIONALISATION

The introduction of CE definitions in a document indicated its institutionalisation in a voivodeship. Definitions were introduced in ten strategies (Annex 2); in five strategies,



no definition was introduced but CE appears. In one voivodeship, Zachodniopomorskie (strategy adopted in 2019), the phrase CE was not used even once in the document. When describing resource management in the face of an environmental crisis, this voivodeship uses the phrase 'green economy'. Analysing the context of the statements, no evidence was found to indicate that the phrase 'green economy' and CE are used synonymously in the development strategy of the Zachodniopomorskie Voivodeship, hence, in the following analysis, this voivodeship is omitted. CE was included in various parts of a strategy depending on the voivodeship but none of those surveyed included the concept in all 12 elements of the region's development strategy. The most extensive coverage (10 out of 12 elements) of the document was in the Wielkopolskie Voivodeship; four others also ranked above the median (R3, R5, R6, R10); the fewest elements containing the CE keyword were in R7 and R14.

In the main parts of a strategy, average mentions of CE were close to each other, with 56% of indications for strategic intent, 58% for planning context and 53% for strategic directions (the exception was strategic architecture, where the concept was described least often in only 10%).

Within the main parts of the strategy model, the frequency of CE in strategy elements varied. CE was mentioned most frequently in voivodeship action areas (for 14 strategies), diagnosis (for 13) and stakeholders (for 13). The stakeholder groups, mentioned in the context of CE in the documents, can be divided into public sector (central and local government administration), private sector (business entities) and civic sector (non-governmental organisations, unaffiliated residents) (Kowalska, Szyja, 2023). Stakeholders from the private sector were mentioned most frequently in 12 strategies, from the civic sector in ten, and from the public sector least frequently in seven.

The concept was least frequently present in the elements: indicators for implementing strategic and operational objectives, environmental impact forecast and strategy implementation system (in just two strategies each). In the R13 voivodeship, funding sources for CE implementation were the only ones described. Figure 1 presents the institutionalisation of CE in the different parts of the regional development strategy.

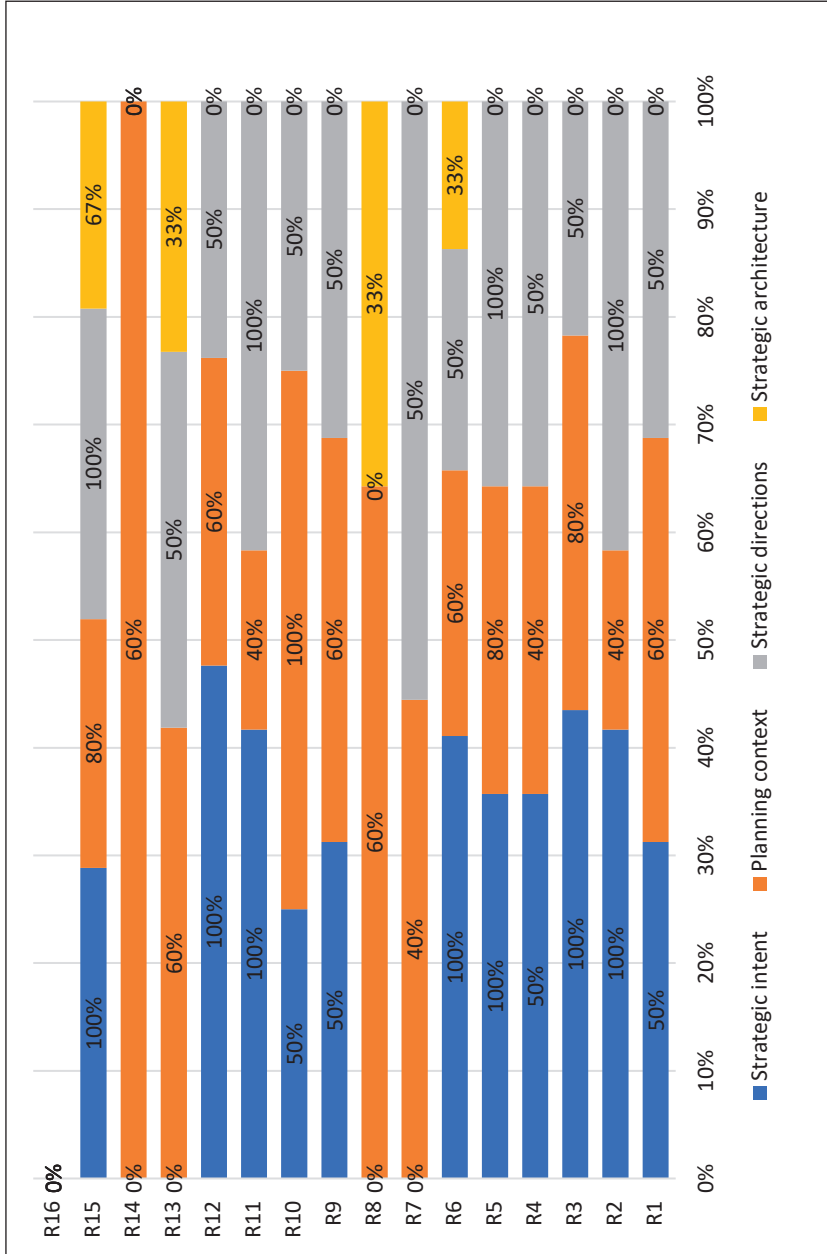
The strongest institutionalisation, calculated as the percentage of the occurrence of CE and its synonyms in a voivodeship's strategy elements, was in R15 (83.33%). R15 is also the overall leader ahead of the next voivodeship, R5, by 17 percentage points (66.67%). Voivodeships R3, R6 and R10 also had coverage above 50%. The weakest institutionalisation was observed in R14 and R7. The relationships between the co-occurrence of CE in the strategy's baseline elements were examined using Spearman's rank-order correlation. The results are presented in Table 2.

Table 2. Correlation of CE institutionalisation in the regional development strategy model

Variables p<0,05	Intent	Context	Directions	Architecture
Intent	1.000	0.301	0.758	-0.024
Context	0.301	1.000	0.157	0.260
Directions	0.758	0.157	1.000	0.003
Architecture	-0.024	0.260	0.003	1.000

Source: own elaboration

Figure 1. Degree of institutionalisation of CE in voivodeship strategies in Poland



Source: own elaboration



There is a strong correlation between strategic intent and strategic direction. This means that the inclusion of CE in a region’s strategic or operational objectives was linked to a definition of CE contained in the vision and accepted by stakeholders. A weak correlation exists between strategic intent and planning context and strategic architecture and planning context. No statistically significant correlation was noted between strategic intent, strategic architecture, strategic directions and planning context.

HYPOTHESIS VERIFICATION

Hypothesis H1 suggests a correlation with a poor state of the environment as expressed by its pollution from 2016, the previous strategy period, was taken as an explanation for the discrepancy in the institutionalisation of CE in the voivodeship strategies.

This hypothesis is valid for the Wielkopolskie, Łódzkie, Małopolskie and Śląskie Voivodeships. These regions were characterised by high environmental pollution in 2016 and made a stronger institutionalisation of CE during the development of the 2030 strategy. Also, the hypothesis corresponds to the Lubuskie, Warmińsko-Mazurskie, and Lubelskie Voivodeships. This is because these are regions characterised by low environmental pollution and, at the same time, a lower level of CE institutionalisation.

An analysis of the correlation of the degree of pollution with CE institutionalisation shows a negative, very weak relationship, which confirms hypothesis H1 as statistically significant. The values for the correlation coefficients between these variables demonstrate this.

Table 3. Correlations between variables of the CE institutionalisation model

Variables p<0,05		Environmental pollution	CE Definition	CE Institutionalisation
Environmental pollution	Spearman	1	-0.1261	-0.1591
	Kendall	1	-0.1065	-0.1229
CE Definition	Spearman	-0.1261	1	-0.0141
	Kendall	-0.1065	1	-0.0124
CE Institutionalisation	Spearman	-0.1591	-0.0141	1
	Kendall	-0.1229	-0.0124	1

Source: own elaboration

Hypothesis H2 assumes that voivodeships with high environmental pollution define CE concepts in their strategies. This observation was accurate for voivodeships R1, R7, R13 and R15. Voivodeships R4 and R14 were the leaders in terms of low environmental pollution, and at the same time, both their strategies introduced a definition of CE. Examining the correlation between defining the CE concept and the degree of pollution shows no statistically significant correlation. Thus, it should be concluded that there is no correlation between introducing a CE definition and the state of environmental pollution in the voivodeship.

Hypothesis H3 assumes that a high level of institutionalisation is associated with introducing a definition of CE in a region’s strategy. No definition of the concept was found in five strategies: two were characterised by a level of institutionalisation above

50%, two by precisely 50% and one by 33.33%. The values of Spearman's  $r$  and Kendall's tau coefficients indicate no statistically significant relationship between the definition of the CE concept and its degree of institutionalisation. Thus, it should be concluded that there is no relationship between the level of institutionalisation of CE and its definition in a region's strategy.

## DISCUSSION

The institutionalisation of CE in Polish regions follows the current European trend (Petit-Boix, Leipold, 2018) and the pressure for transitions at a regional level (Sileryte et al., 2020). Regions, in their development strategies, not only set its framework but also indicate specific areas of implementation and research shows that there are differences in the institutionalisation of CE between regions, which is in line with the conclusion here (Avdiushchenko, 2018; Tapia et al., 2021). The two parts of Sileryte's model of regional CE development strategies were the most frequent: strategic intention and strategic direction. This result should be associated with the various development conditions of the individual voivodeships (Sileryte et al., 2018), which corresponds to the assumptions of adaptive governance theory.

The concept of CE had been in place in EU countries for about three years at the time of the strategies under study here. This may have been too short for voivodeship actors to fully adopt it as it should be noted that administrations are by nature conservative and conservative in their actions (Braams et al., 2022; Peters, 2021). Objectives are formulated based on the current state of knowledge and experience. The academic community's interest in CE issues in regions is also a relatively new subject (Arsova et al., 2022), and it is common practice for academics to be involved in developing regional strategies. Consequently, CE in strategies is instead only signalled and this creates the conditions for future activities in this area.

Taking this perspective, the limited extent of CE implementation identified can be explained by the early stage of development of the concept (Vanhamki et al., 2020). Polish regions have recognised its role and importance, absorb external institutional pressure from the EU level (Sileryte et al., 2020), but lack of experience and ready-made solutions may limit their actions. This often results in a conservative narrowing only to issues already known to regions as CE actions, such as separate waste collection or wastewater treatment (Vanhamaki et al., 2019). In line with this observation, there is an emerging need for regions to set targets with a monitoring system as a prerequisite for the economy's transition from linear to circular (Smol et al., 2018; Winans et al., 2017).

A correlation between the high level of institutionalisation of CE in the regions and high environmental pollution is found [H1]. For the seven regions with high environmental pollution, the CE concept was widely implemented in regional development strategies. This is in line with the European Green Deal, which links the introduction of CE to the need to halt environmental degradation (COM, 2023). CE also thrives in cities and industrial districts (Niang et al., 2023) for which high environmental pollution is a feature. Consistent with adaptive governance theory, the observed variation in CE institutionalisation is due to differences in adaptive capacity between regions (Folke et al., 2005). High environmental pollution in a region can be an impetus for action, however, it is essential to remember that a region's adaptive capacity depends on regional conditions (Tapia et al., 2021), such as the economy's structure, infrastructure availability

or social attitudes. Therefore, we confirmed the hypothesis that a region's adaptation to increased pollution manifests itself through adopting CE.

Hypothesis 2 concerns the correlation between the definition of CE in a region's development strategy and environmental pollution. According to this, if a region plans activities to make the CE concept a reality, it should be characterised in the strategy. Due to its popularity and pressure for implementation from the EU (Shpak et al., 2021), CE is present in all (with one exception) voivodeship development strategies. It was defined in only 10 of them. Hypothesis H2 was verified negatively, as it was shown that there was no relationship between high environmental pollution and the definition of CE. This means that, for the selected regions, actions in line with CE are not associated with adopting a definition. This can be explained by the fact that CE is a fuzzy concept (Arsova et al., 2022), characterised by a multiplicity of definitions (Kirchherr et al., 2017) which can be a barrier to the implementation of socio-economic concepts into economic practice (Engelman, 2013; Janoušková et al., 2019; Loiseau et al., 2016). Increasing the social engagement postulated in research (Ashton, 2008; Avdiushchenko, 2018; Chertow et al., 2008; Le et al., 2023; Smol et al., 2018) will be difficult without linguistic unity of the concept. The reasons for the lack of clarification of the concept of CE would require complementary research, such as interviews with strategy authors, which is recommended in further research directions.

Linguistic blurring is also linked to the results of verifying the third hypothesis (H3). It was assumed that a high level of institutionalisation of the concept of CE is correlated with its definition by region but the results show no correlation between the introduction of CE definitions and institutionalisation. Regions that have not defined CE use the concept in different parts of the document, inserting references to CE in strategic objectives, operational objectives, actions and, in two cases, in the vision as well. We see two possible explanations for this: firstly, the concept of CE is evolving, and secondly the technical and technological possibilities along with available funding forms are changing (Sastre et al., 2018). Thus, rigidly inscribing a definitional framework for CE in the strategy could be limiting for future regional-level and regionally funded local actions. The absence of a definition or its vague nature could allow for flexible, more straightforward and faster implementation of new solutions embedded in the concept in the future. Secondly, CE, in the minds of many of its stakeholders, is identified with the issues of waste management (Vanhamaki et al., 2019) and recycling (Mhatre et al., 2021). This is well known to regional authorities in Poland, as their tasks include environmental protection. It is, therefore, possible that they do not define CE despite using the concept on the assumption that it is a concept similar to commonly used terms such as recycling. The blurring of definitions and the variety of concepts treated as synonymous with CE results in further problems in the creation of regional policy. Some voivodeships undertake atmospheric protection, waste management, recycling and water purification activities without indicating a link between these activities and CE. Thus, further research is suggested, the aim of which should be to identify the actions of regions that can be attributed as manifestations of CE implementation. This means, therefore, starting not from a definition of the phenomenon but from a categorisation of activities, the types of which will show how CE is interpreted. It should be pointed out that the problem of the lack of definition of a CE model in regional development strategies has not been recognised before (Arsova et al., 2022).

## SUMMARY

The study's main objective was to fill the research gap regarding differences in structuring the CE concept in regional development strategies (Christensen et al., 2022; Kruse, Wedemeier, 2023; Ranta et al., 2020) according to adaptive governance theory. According to research, it is observable that the implementation of this concept varies between EU member states (Shpak et al., 2021) and this study shows that this process varies strongly between regions within a country. As the effectiveness of CE depends on its adaptation at all levels (Kirchherr et al., 2017), it must be assumed that the present study shows the inadequacies of the assessment of adaptation made generally at the level of the whole country, as well as comparison of countries rather than regions, and this leads to over-generalisation of the assessment. Thus, this study fits into the research gap regarding research into CE institutionalisation in regions (Arsova et al., 2022; Kruse et al., 2023).

In almost all province voivodeships, institutionalisation of the CE concept was observed found. Moreover, in only two cases were stakeholder groups not identified in the strategy, and the strategic intent in the seven strategies took the form of specific objectives (Annex 2). The indication of stakeholders shows that the process of institutionalisation is progressing, and real action is derived from available solutions and opportunities for action. Exploring stakeholders' attitudes towards implementing CE in a region and how they are involved in the process should allow for a better understanding of the changes and a more accurate mapping of institutionalising new idea concepts at the regional level. The application of this research extends to policymakers at regional and national levels. Regional governments can use the findings to develop and refine CE strategies tailored to their specific settings. The study also provides valuable information for universities and research institutes to further research into CE implementation.

A strategy is a highly generalised document, envisioning the future state of affairs and projecting into the next decade. Therefore, the document represents a snapshot of the institutionalization of the CE concept at a specific time, with declared expectations, specific authority, projections of key directions and funding sources. This means that the analysis of the information contained in a region's strategy only allows us to determine the overall degree of CE institutionalization. From a theoretical perspective, the study provides a basis for further work. We have shown that the process of CE institutionalization has begun and is ongoing but it does not allow us to conclude the outcome of such institutionalisation. In practical terms, operational programs based on the strategy will be crucial and only their analysis will allow such conclusions to be formulated, thereby setting a direction for future research. The findings provide recommendations for local territorial units who are encouraged to incorporate CE principles into their local development strategies, conduct regular environmental assessments to tailor CE projects to specific local conditions and foster collaboration among multiple stakeholders for a cohesive and adaptable strategy. By aligning CE goals with regional objectives and leveraging diverse forms of knowledge, these units can effectively address specific environmental challenges and promote sustainable development.

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## ANNEX 1. SUMMARY OF DATA SOURCES – VOIVODESHIP STRATEGIES

Code	Voivodeship	Document title	Year	Number of pages
R1	dolnośląskie	Strategia Rozwoju Województwa Dolnośląskiego 2030	2018	80
R2	kujawsko-pomorskie	Strategia rozwoju województwa kujawsko-pomorskiego do 2030 roku – Strategia Przyspieszenia 2030+	2020	247
R3	lubelskie	Strategia Rozwoju Województwa Lubelskiego do 2030 roku	2021	131
R4	lubuskie	Strategia Rozwoju Województwa Lubuskiego 2030	2021	98
R5	łódzkie	Strategia Rozwoju Województwa Łódzkiego 2030	2021	121
R6	małopolskie	Strategia Rozwoju Województwa „Małopolska 2030” Część I: Diagnoza I Prognozy Rozwojowe Strategia Rozwoju Województwa „Małopolska 2030” Część II: Strategia	2021 2021	142 102
R7	mazowieckie	Strategia Rozwoju Województwa Mazowieckiego 2030+	2022	112
R8	opolskie	Strategia Rozwoju Województwa Opolskiego – Opolskie 2030	2021	88
R9	podkarpackie	Strategia rozwoju województwa – Podkarpackie 2030	2020	164
R10	podlaskie	Diagnoza Strategiczna Województwa Podlaskiego Strategia Rozwoju Województwa Podlaskiego 2030	2020 2021	182 103
R11	pomorskie	Strategia Rozwoju Województwa Pomorskiego 2030. Pomorskie 2030	2021	133
R12	śląskie	Strategia Rozwoju Województwa Śląskiego „Śląskie 2030” – Zielone Śląskie	2020	167
R13	świętokrzyskie	Strategia Rozwoju Województwa Świętokrzyskiego 2030+	2021	104
R14	warmińsko-mazurskie	Warmińsko-Mazurskie 2030 Strategia rozwoju społeczno-gospodarczego	2020	96
R15	wielkopolskie	Strategia rozwoju województwa wielkopolskiego do 2030 roku	2020	127
R16	zachodniopomorskie	Strategia Rozwoju Województwa Zachodniopomorskiego do roku 2030	2019	72

## ANNEX 2. CODING ON THE PRESENCE OF THE CE CONCEPT IN A REGIONAL DEVELOPMENT STRATEGY

Main parts of a Regional Development Strategy model	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15	R16
Elements of a regional development strategy																
I. Strategic intent																
1. strategic objectives	0	1	1	0	1	1	0	0	0	0	1	1	0	0	1	0
2. operational objectives	1	1	1	1	1	1	0	0	1	1	1	1	0	0	1	0
Sum (1+2)	1	2	2	1	2	2	0	0	1	1	2	2	0	0	2	0
II. Planning context																
3. diagnosis	1	1	1	1	1	1	0	1	1	1	1	1	0	1	1	0
4. implementation indicators for strategic and operational objectives	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0
5. model of the functional and spatial structure of the voivodeship	0	0	1	0	1	0	0	0	0	1	0	1	0	0	1	0
6. areas of strategic intervention	1	0	1	1	1	1	1	1	1	1	0	0	1	1	1	0
7. voivodeship activity areas	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	0
Sum (4+5+6+7)	2	1	3	1	3	2	2	2	2	4	1	2	3	2	3	0
8. vision for the development of the region	0	1	0	0	1	0	0	0	0	0	1	0	0	0	1	0
9. stakeholders	1	1	1	1	1	1	1	0	1	1	1	1	1	0	1	0
Sum (8+9)	1	2	1	1	2	1	1	0	1	1	2	1	1	0	2	0



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