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Comparison of the Readiness of Manufacturing Companies to Implement the Principles of the Circular Economy, Taking into Account an Organisation's Size

Kamila Piskorz[1], **Justyna Litwinek**[2], **Agnieszka Sitko-Lutek**[3]

[1] University of Maria Curie-Skłodowska in Lublin, Faculty of Economics, M. Curie-Skłodowska Square 5, 20-031 Lublin, Poland, e-mail: kamila.piskorz@mail.umcs.pl,
ORCID: https://orcid.org/0000-0002-3843-9671

[2] University of Maria Curie-Skłodowska in Lublin, Faculty of Economics, M. Curie-Skłodowska Square 5, 20-031 Lublin, Poland, e-mail: justyna.litwinek@mail.umcs.pl,
ORCID: https://orcid.org/0009-0008-2789-0716

[3] University of Maria Curie-Skłodowska in Lublin, Faculty of Economics, M. Curie-Skłodowska Square 5, 20-031 Lublin, Poland, e-mail: agnieszka.sitko-lutek@mail.umcs.pl,
ORCID: https://orcid.org/0000-0002-3073-1184

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ABSTRACT

Objective: The article is devoted to the readiness of manufacturing enterprises to introduce the assumptions of the circular economy (CE). The purpose of the study is to see if there are statistically significant differences between the declared readiness to adopt the principles of the circular economy among manufacturing enterprises of different sizes.

Research Design & Methods: The paper uses a literature analysis method and a quantitative method, using a survey technique in the form of a questionnaire. The survey was conducted using the CAWI method. The respondents were owners and managers of manufacturing enterprises

with registered operations in Poland. The size of the research sample was 205. The obtained data were analysed using the Kruskal-Wallis non-parametric test for independent samples.
Findings: The results indicate statistically significant differences between companies of different sizes in terms of social pressure, availability of raw materials, external support, internal capacity of the organisation, perceptions of cost-effectiveness, and readiness to implement CE practices.
Implications/Recommendations: The study provides information on the impact of various factors on the decision-making process in companies *vis-à-vis* implementing CE practices. The survey results highlight that smaller companies experience difficulty accessing resources and external support, affecting their willingness to implement the circular economy. These differences suggest the need for a more individualised approach to support policies that could consider the specificities and needs of companies of different scales of operations. Further research should focus on identifying specific barriers and opportunities to support implementing the circular economy in companies with different business profiles. It is also worth investigating the impact of organisational culture and innovation on the propensity to adopt the principles of the circular economy.
Contribution: Despite the literature on the circular economy, more research needs to be done focusing on differences in readiness to implement circular economy practices depending on the size of the enterprise. This study fills this gap by providing empirical data on the above topics. The study provides new evidence of statistically significant differences between companies of different sizes, which have yet to be sufficiently studied.

Article type: original article.

Keywords: the readiness to implement a circular economy, manufacturing enterprise, sustainable development, circular economy, level of readiness.

JEL Classification: C14, D22, Q56.

1. Introduction

The development of the circular economy (CE) is becoming an increasingly important element of global sustainable development strategies. Unlike the traditional linear model, the circular economy aims to minimise waste through efficient resource management, reuse, regeneration, and recycling. The CE model not only addresses environmental issues associated with excessive resource consumption and waste emissions but also creates new business opportunities for companies.

However, implementing circular economy principles requires significant organisational changes and investments, for which not all companies are equally prepared. A firm's readiness to implement CE can be influenced by various factors, such as resource availability, external support, social pressure, stakeholder expectations, attitudes toward sustainable development, and internal organisational potential. An important part of the analysis is understanding how the varying sizes of companies affect their ability to implement CE principles.

The aim of this article is to examine whether there are statistically significant differences in the declared readiness of manufacturing companies of various sizes to implement CE principles. The analysis includes identifying statistically significant differences in companies' readiness to implement CE principles across five key dimensions: availability of resources and external support, attitudes and perceptions toward sustainable development, perceived behavioural control, internal organisational potential, and social pressure and expectations of external stakeholders.

The results of the study will help to understand the key factors influencing the ability of companies to implement the circular economy and will highlight areas that require special attention in the context of support policies. This will make it possible to identify the barriers and challenges that manufacturing companies face in the context of implementing circular economy principles, as well as to determine which forms of support would be most effective. By collecting and analysing data from different groups of companies, the article contributes to understanding the dynamics of CE implementation in the Polish business context, providing valuable insights for policymakers, decision-makers, and management.

2. The Circular Economy Concept

Currently, the most widespread economic model is one based on a linear process, following the principle "take → make → use → dispose of" (Pikoń, 2018, p. 23). This model is characterised by a one-way flow of materials, where the end product ultimately becomes waste. In this approach, the focus is on the economic dimension, largely neglecting the significance of socio-ecological needs (Lieder & Rashid, 2016). In contrast, the CE is the opposite model. Here, the economy should be designed to maximise resource use by minimising waste generation and greenhouse gas emissions, as well as by recovering raw materials and reusing them in production.

For the purposes of further analysis in this paper, the adopted definition of the circular economy is the one established by the European Commission. In its 2015 communication, the Commission stated that "CE is an economy in which the value of products, materials, and resources (…) is maintained for as long as possible, and waste generation is minimised" (Komisja Europejska, 2015).

Some researchers view CE as an industrial economy comprising two complementary cycles of material flows: the biological and technological cycles (Aldersgate Group, 2024) (Fig. 1). The biological cycle allows a used product to re-enter the biosphere without processing, while the technological cycle focuses on high-quality products and is oriented toward maintaining or enhancing their economic value (Aldersgate Group, 2024). A used product in the technological cycle must undergo a recovery process to be converted into a raw material that can be reused in production.

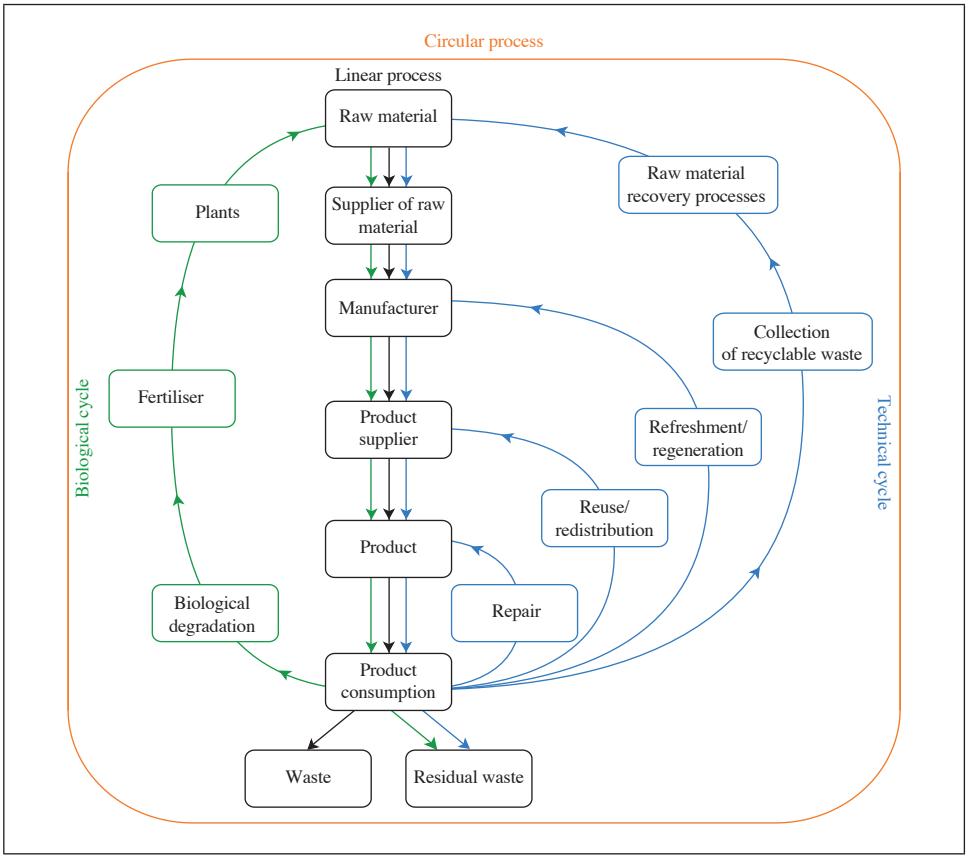

Fig. 1. Circular Process

Source: the authors, based on: Pikoń (2018) and KPMG (2024).

CE changes the function of resources in the economy, where waste becomes a valuable input for another process, and products can be repaired, reused, or upgraded instead of being discarded (Preston, 2012). Additionally, this model addresses current socio-ecological needs and its implementation aids in minimising market risks by reducing waste, stabilising raw material prices, improving logistical processes, shortening supply chains, and decreasing environmental degradation (Ellen MacArthur Foundation, 2015). In this sense, CE is considered "as a regenerative system in which resource input and waste, emission, and energy leakage are minimized by slowing, closing, and narrowing material and energy loops. This can be achieved through long-lasting design, maintenance, repair, reuse, remanufacturing, refurbishing, and recycling" (Geissdoerfer *et al.*, 2017, p. 762).

3. Readiness of Enterprises to Implement Changes

It is difficult to introduce innovations where there is no readiness for them. Therefore, many authors consider readiness a crucial element of successful organisational change, often finding its physical manifestation in plans and programmes developed by organisations (Arons, Hurlburt & Horwitz, 2011). In a broad sense, readiness is the extent to which an organisation is willing and able to implement a specific innovation (Drzensky, Egold & van Dick, 2012). In a narrow sense, readiness is the operationalisation of organisational activities that bridge the gap between evidence-based prevention and intervention strategies and their practical implementation (Scaccia *et al*., 2015).

From a behavioural perspective, readiness is treated as the result of competence, motivation, and capabilities that determine the behaviour of an entity (Michie, van Stralen & West, 2011). Many authors emphasise that it is inappropriate to use individual readiness to describe organisational behaviour since the organisation is more than the sum of its members. Therefore, Weiner (2009, p. 1) defines organisational readiness as a "shared resolve to implement a change (change commitment) and shared belief in their collective capability to do so (change efficacy)." He points out that the level of readiness for change is determined by how much members of the organisation value the change and how they assess its three key implementation elements: task requirements, resource availability, and situational factors (Weiner, 2009). Analysing the author's work, one can conclude that readiness is a spectrum: The higher it is, the more willing members of the organisation are to initiate changes, put in more effort, show greater perseverance, and exhibit more cooperative behaviour. The result is more effective implementation (Weiner, 2009). Conversely, as readiness decreases, the likelihood that implementation fails increases. Scaccia *et al*. (2015) propose that the organisational readiness model consists of three specific and dynamic components: motivation, general capacity, and innovation-specific capacity. While in Weiner's (2009) model, the indicated elements of readiness occur together and interact, in Scaccia *et al*. (2015) model, they can be measured independently, providing concrete, actionable steps in each group.

In the subject literature, several works analyse in detail the influence of organisational size on its ability to adapt and implement CE principles. As Boons and Wagner (2011) note, larger companies often have better resources and adaptive capabilities, which can be key in implementing sustainable innovations. Meanwhile, smaller businesses, though generally more flexible and open to innovation, struggle with resource constraints, which may hinder the full adoption of CE principles (Boons & Wagner, 2011).

In the context of research on CE implementation readiness, some researchers, such as Kirchherr, Reike and Hekkert (2017), propose using readiness assessment models to identify key factors determining innovation implementation capacity.

Such models consider both internal and external resources, as well as cultural and strategic aspects, that can impact the effectiveness of implementation (Kirchherr, Reike & Hekkert, 2017).

Table 1. A Compilation of Selected Works on CE Implementation Readiness and Sustainable Innovations in Enterprises

Authors	Key Findings
Momete (2020)	Developing a readiness index based on economic, social, and environmental factors that assist in diagnosing the current situation and identifying EU leaders in readiness for transitioning to the CE
Singh, Chakraborty & Roy (2018)	The extended theory of planned behaviour model of planned behaviour includes environmental engagement and green economic incentives that better explain CE readiness compared to the original theory of planned behaviour model. It demonstrates the influence of attitudes, social pressure, environmental engagement, and green economic incentives on CE readiness
Prasad & Manimala (2018)	An analysis of companies' capacity to develop the CE concept in India through social innovation, showing how companies can incorporate social and economic innovation for sustainable development
Prieto-Sandoval, Jaca & Ormazábal (2018)	A systematic literature review to understand the fundamental concepts and principles of CE and their relationship to eco-innovation, indicating various ways of understanding and applying CE. CE encompasses three main elements: resource and energy recirculation, minimisation of resource demand, and value recovery from waste; a multi-level approach; CE's significance is considered a path to achieving sustainable development; a close relationship with societal innovation
Horbach & Rammer (2020)	Econometric analysis showing that CE innovations positively impact company turnover and employment growth, emphasising that CE innovations help achieve sustainable development goals by focusing on environmental, economic, and social dimensions
Ul-Durar *et al*. (2023)	The growth of CE depends on leveraging knowledge resources and dynamic orientations (stakeholder orientation, sustainability orientation, organisational learning orientation, and entrepreneurial orientation). CE measurement techniques are in the early stages of development

Source: the authors.

Studies have also examined the impact of employees' specialised knowledge and environmental awareness on readiness to implement CE principles, showing that a high level of knowledge and awareness in these areas correlates with a greater willingness to introduce circular economy principles (Afteni, Păunoiu & Afteni, 2021) (Table 1). Companies that decided to implement CE often experienced changes in management and work organisation, further supporting the adaptation process (Atiku, 2020). Ul-Durar *et al*. (2023) noted that knowledge management and sustainable innovations can affect companies' readiness to transition to CE. In their

view, the successful development of CE largely depends on leveraging knowledge resources and the dynamics of orientation. The authors mention orientations towards stakeholders, sustainability, organisational learning, and entrepreneurship (Ul-Durar *et al*., 2023) (Table 1).

4. Research Model

The research model was built based on a literature review, assuming that external factors such as stakeholder expectations and the availability of support and recycling resources influence entrepreneurs' attitudes in the context of the CE, which in turn correlates with their level of readiness (see Fig. 2) (Piskorz & Sitko-Lutek, 2023). Understanding and engaging various stakeholder groups is crucial for effective CE implementation (Piskorz & Sitko-Lutek, 2023).

Implementing CE principles in organisations is a complex, multi-stage process that can be supported or hindered by various factors, including societal pressure and external stakeholder expectations; the availability of resources and external support; attitudes and perceptions towards sustainable development; perceived behavioural control; and the internal capacity of the organisation to implement CE (Piskorz & Sitko-Lutek, 2023).

Societal pressure and external stakeholder expectations influence the organisation's perceived behavioural control, motivating investment in resources that support CE. The availability of resources and external support is crucial for effective CE implementation, and a lack of recycled resources may pose a significant barrier (Piskorz & Sitko-Lutek, 2023).

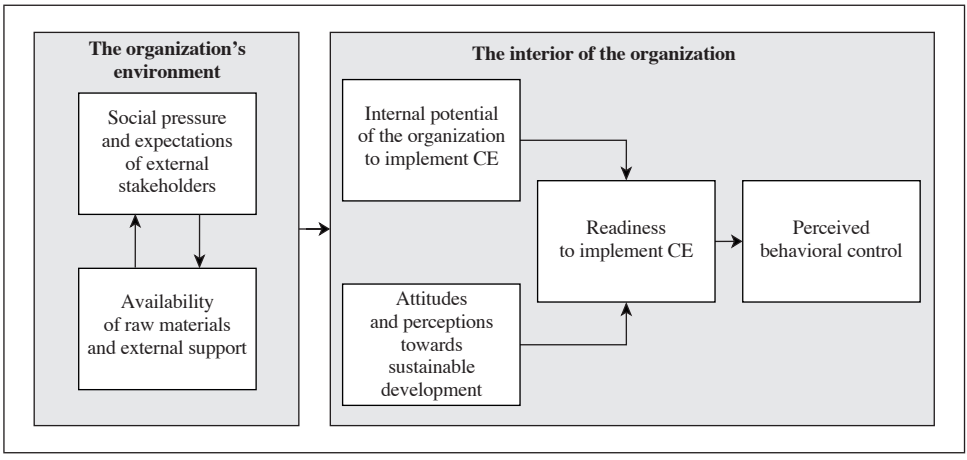

Fig. 2. A Conceptual Model of Readiness for Implementing a Circular Economy
Source: Piskorz & Sitko-Lutek (2023, p. 480).

This model assumes that organisations perceiving themselves as capable of implementing changes due to their available resources and competencies, and holding the right attitudes, are more ready to adopt CE practices (Piskorz & Sitko-Lutek, 2023). An organisation's internal capacity, including technology, finances, and ecological awareness, determines its ability to adapt and implement sustainable development practices, as these factors shape perceptions of the difficulty or ease of taking action (Piskorz & Sitko-Lutek, 2023).

5. Methodology

5.1. Purpose and Research Questions

The aim of the conducted study was to examine whether there are statistically significant differences between the declared readiness to implement the principles of a circular economy among manufacturing companies, taking into account variations in company size. Based on the developed readiness model for implementing a circular economy, the following research questions were formulated:

– Is there a statistically significant difference between company sizes in terms of social pressure and external stakeholder expectations?

– Is there a statistically significant difference between company sizes in terms of the availability of raw materials and external support?

– Is there a statistically significant difference between company sizes in terms of the organisation's internal capacity to implement a circular economy?

– Is there a statistically significant difference between company sizes in terms of attitudes and perceptions of the profitability of a circular economy?

– Is there a statistically significant difference between company sizes in terms of readiness to implement circular economy solutions in the company?

5.2. Sample and Data Collections

To achieve the study's objective and answer the research questions posed, data were collected through an online survey conducted using the CAWI (computer-assisted web interviewing) technique from 25 November to 11 December 2022.

The sampling was conducted considering the diversity of enterprises in terms of size, industry, and operational scope. The sampling criteria included enterprises operating in the manufacturing sector in Poland, specifically targeting their owners and management staff. The questionnaire was distributed by a professional research institution, ensuring a representative sample. Additionally, a random selection of enterprises from available databases of manufacturing firms was utilised.

The thematic scope included assessing companies' readiness to implement circular economy principles, analysing their involvement in practices related to this economy, and identifying potential obstacles and challenges. The survey included

companies of various sizes and operational scopes. The research sample consisted of 205 companies in total. The precise distribution and percentage share of the research sample are presented in Table 2 located in the results section.

5.3. Tool

The questionnaire was independently developed by the authors based on a review of the literature and existing research tools. The process of creating the research tool included several stages:

1. Review of the literature and identification of key variables.
2. Formulation of questions and measurement scales.
3. Content validation through consultations with experts.

When developing the questions in the questionnaire, selected scientific articles and publications related to the circular economy and research tools used in previous studies were utilised. The selected works addressed issues related to CE entrepreneurship, including emerging circular SMEs, circular firms and startups, the role of social entrepreneurship in CE practices, and the support ecosystem for circular entrepreneurship (Suchek, Ferreira & Fernandes, 2022); identification and analysis of barriers hindering CE implementation in the manufacturing sector (Badhotiya *et al*., 2022); a conceptual model for measuring readiness for change for SMEs adopting CE (Thorley, Garza-Reyes & Anosike, 2022); analysis of management practices implemented to design a CE business model, with a focus on how companies can create and capture value from a CE business model (Ünal, Urbinati & Chiaroni, 2019); and an extended theory of planned behaviour model to explore SMEs' readiness for CE, highlighting that environmental engagement and green economic incentives are additional predictors in studying readiness to implement CE in enterprises (Singh, Chakraborty & Roy, 2018). These works provided information on key variables and measurement scales used in studies on enterprises implementing CE.

The research tool was a specially designed questionnaire consisting of 38 questions on a 5-point Likert scale (1 – strongly disagree, 2 – somewhat disagree, 3 – neutral, 4 – somewhat agree, 5 – strongly agree). The questions were based on topics including perceived profitability of a circular economy, the influence and pressures of the external environment (micro and macro) on the pace of CE adoption, the company's capacity to implement CE (technological, infrastructural, financial, intellectual, and workforce competency potential), the availability of recycled materials, and the organisation's pro-environmental actions. 5 groups of factors described in the applied research model were identified within the questions:

1) social pressures and expectations of external stakeholders were assigned 7 items,

2) availability of raw materials and external support had 4 items,

3) attitudes and perceptions toward sustainable development comprised 12 items,
4) the organisation's internal potential to implement CE included 12 items,
5) perceived behavioural control accounted for 3 items.

Additionally, demographic questions were included about the respondent's age and position, as well as three additional questions to determine the characteristics of the respondent's company, including size, industry, and geographic scope.

5.4. Data Analysis

The responses obtained from the respondents were placed in a proprietary database and processed using statistical methods with MS Excel and IBM SPSS software. Descriptive statistics were employed to characterise the research sample. The Kruskal-Wallis test was used to determine statistically significant differences between groups.

6. Results

6.1. Sample

The study was conducted on a cross-sectional sample of 205 enterprises. The characteristics of the research sample are presented in Table 2.

Table 2. General Characteristics of a Study Sample (Total $n = 205$)

Variable	Percentage
Company size	
Up to 9 people (micro-enterprises)	14
From 10 to 49 people (small enterprises)	19
From 50 to 249 people (medium-sized enterprises)	33
From 250 to 499 people (large enterprises)	18
500 people and more (huge enterprises)	17
Scope	
Regional	30
National	74
Foreign	49
Industry	
Food	13
Automotive/motor industry	9
Metal industry	7
Furniture manufacturing	7
Manufacturing (general)	6
Electronics	6

Table 2 cnt'd

Variable	Percentage
Wood processing/handling	4
Machinery production	4
Paper manufacturing	4
Window production	3
Energy	3
Cable manufacturing	2
Chemical	2
Packaging production	2
Cosmetic	2
Decoration/ornaments/candles	2
Others	22

Source: the authors.

6.2. Scales

The reliability of all dimensions included in the subscales was satisfactory, with values exceeding 0.70. Cronbach's alpha for each subscale was as follows: 0.73 for the subscale of social pressures and expectations of external stakeholders, 0.91 for the internal organisational potential to implement CE, 0.75 for perceived behavioural control, 0.85 for attitudes and perceptions towards sustainable development, and 0.77 for availability of raw materials and external support.

6.3. Descriptive Statistics

A detailed analysis of the basic descriptive statistics, such as means and standard deviations across all five dimensions (Table 3), allows for assessing the overall readiness of Polish enterprises to implement CE.

Table 3. Means and *SD* of All Dimensions in the Research Sample

Questionnaire Dimensions	Company Size	Mean	*SD*
Availability of resources and external support	up to 9 people (micro-enterprises)	2.76	0.68
	from 10 to 49 people (small enterprises)	2.97	0.90
	from 50 to 249 people (medium-sized enterprises)	3.52	0.89
	from 250 to 499 people (large enterprises)	3.38	0.81
	500 people and more (huge enterprises)	3.46	0.81
	overall	3.28	0.88

Table 3 cnt'd

Questionnaire Dimensions	Company Size	Mean	*SD*
Attitudes and perception towards sustainable development	up to 9 people (micro-enterprises)	3.46	0.62
	from 10 to 49 people (small enterprises)	3.75	0.58
	from 50 to 249 people (medium-sized enterprises)	3.82	0.63
	from 250 to 499 people (large enterprises)	3.68	0.62
	500 people and more (huge enterprises)	3.92	0.36
	overall	3.75	0.59
Perceived behavioural control	up to 9 people (micro-enterprises)	3.29	0.79
	from 10 to 49 people (small enterprises)	3.56	0.89
	from 50 to 249 people (medium-sized enterprises)	3.81	0.71
	from 250 to 499 people (large enterprises)	3.52	0.80
	500 people and more (huge enterprises)	3.72	0.80
	overall	3.60	0.81
Internal organisational potential for implementing CE	up to 9 people (micro-enterprises)	3.19	0.76
	from 10 to 49 people (small enterprises)	3.61	0.76
	from 50 to 249 people (medium-sized enterprises)	3.81	0.71
	from 250 to 499 people (large enterprises)	3.53	0.69
	500 people and more (huge enterprises)	3.68	0.70
	overall	3.61	0.74
Social pressure and expectations of external stakeholders	up to 9 people (micro-enterprises)	3.23	0.67
	from 10 to 49 people (small enterprises)	3.67	0.54
	from 50 to 249 people (medium-sized enterprises)	3.73	0.64
	from 250 to 499 people (large enterprises)	3.60	0.70
	500 people and more (huge enterprises)	3.63	0.55
	overall	3.61	0.64

Source: the authors.

For each dimension, the average ranged from 3.28 to 3.75. Considering the 5-point scale used in the questions, we observe a moderate readiness declared by Polish companies to implement the principles of the CE. The highest average was found in the dimension of attitudes and perceptions towards sustainable development, while the lowest was in the availability of raw materials and external support. The other three dimensions obtained similar average values of around 3.60.

Examining the average values obtained in the analysed areas in relation to company size, micro-enterprises demonstrated the lowest average readiness in the

areas of raw material availability, external support, perceived behavioural control, internal organisational potential to implement CE, as well as social pressure and external stakeholder expectations. Medium-sized enterprises exhibited the highest average readiness. In the area of attitudes and perceptions towards sustainable development, micro-enterprises reported the lowest average readiness, while huge enterprises reported the highest.

6.4. Analysis of Variance

The first step was to examine the data structure, including verification of whether the data follows a normal distribution. To achieve this, the Shapiro-Wilk test was conducted. Based on the test results, statistical significance was below the accepted critical value (0.05), indicating a lack of normal distribution. Due to the nature of the data – ordinal scale variables, independent observations, and a non-normal distribution – to determine whether statistically significant differences exist between the groups (5 groups), which also have unequal sample sizes, the Kruskal-Wallis non-parametric test for independent groups was employed.

The test value along with the obtained significance levels is presented in Table 4.

Table 4. Means and SD of All Dimensions in the Research Sample

Group	Test Value	Significance
Availability of raw materials and external support	23.35	< 0.001
Attitudes and perceptions toward sustainable development	12.50	0.014
Perceived behavioural control	8.08	0.089
Internal organisational potential for implementing CE	16.11	0.003
Social pressure and expectations of external stakeholders	14.14	0.007

Source: the authors.

Based on the obtained test values and the comparison of the achieved significance level with the adopted significance level of 0.05, statistically significant differences between the analysed groups (enterprise sizes) were found for 4 out of 5 groups, namely: availability of resources and external support; attitudes and perceptions towards sustainable development; internal organisational potential for CE implementation; social pressure and expectations of external stakeholders.

When comparing pairs between groups, statistically significant differences in the area of availability of resources and external support occurred between micro--enterprises and: huge enterprises, medium-sized enterprises, large enterprises, and between small enterprises and medium-sized enterprises.

In the area of attitudes and perceptions towards sustainable development, statistically significant differences were observed between micro-enterprises and huge enterprises as well as medium-sized enterprises.

For the area of internal organisational potential for CE implementation and the group of social pressure and expectations of external stakeholders, statistically significant differences occurred between micro-enterprises and medium-sized enterprises.

Delving deeper into individual items, of the 38 statements, statistically significant differences (according to the Kruskal-Wallis analysis) could be seen in 18 statements (each group contained at least 1 item with a statistically significant difference). This included all items from the group of availability of resources and external support, 7 items from the group of attitudes and perceptions towards sustainable development, 1 item from the group of perceived behavioural control, 5 items from the group of internal organisational potential for CE implementation, and 2 items from the group of social pressure and expectations of external stakeholders.

7. Summary

Based on the conducted research, it was found that the perception of the readiness of manufacturing enterprises of different sizes to implement CE principles varies. The most significant statistical differences are between micro-enterprises and medium-sized enterprises. Micro-enterprises report limited access to raw materials and external support, lower behavioural control, less internal organisational potential for CE implementation, a more sceptical attitude towards CE, and lower social pressure (including expectations from external stakeholders regarding CE implementation), resulting in potentially lower readiness for CE implementation compared to larger companies. Other enterprise groups report access to a greater number of resources, better access to recycled materials and external support, and consider the ecological aspect of their activities more important when working with external stakeholders. In almost all researched areas (except attitudes and perceptions toward CE), medium-sized enterprises show the highest readiness for CE implementation. This could be due to potentially greater flexibility in adapting their organisations to CE principles compared to large and very large enterprises. Aspects such as differences in management methods and the level of environmental awareness may also influence the declared readiness of companies to implement CE.

The results suggest that micro-enterprises need comprehensive support to better understand and implement CE principles. Educational and informational activities could focus on facilitating the implementation of more sustainable business models,

taking into account the specifics of enterprises of various sizes, scales, and industries. Support policies should be more individualised and tailored to the diverse needs of companies of different sizes.

The study highlights the differences in perceived readiness based on the size of the enterprise, pointing out which areas need improvements in the legal and economic fields to potentially impact increased readiness to implement CE principles across different groups of companies. The study results could be particularly useful to policymakers and regulators, as well as to management staff in manufacturing enterprises, as company motivations and readiness are crucial for formulating and implementing future economic and social strategies. Understanding the dynamics and perception of the circular economy in different types of companies can support the development of models and theories for CE adaptation. However, it is worth emphasising the limitations of the study due to the use of only quantitative research (a questionnaire survey), which limited the scope and detail of the analysis. The obtained results could have been influenced by the specificity of the research sample, such as the dominance of the food industry or the varying number of companies of different sizes. Therefore, further research could focus on specific industries or industry groups.

In the future, it will be worthwhile to supplement the research with qualitative studies, such as interviews with management staff and analysis of company documents in terms of the degree of CE implementation. Further research should consider differences between companies in various countries, as the legal and cultural context can significantly affect the readiness to implement CE. Additionally, repeating the study in subsequent years would be of value in order to capture the dynamics of changes in companies' readiness for the implementation of the circular economy.

Authors' Contribution

The authors' individual contribution is as follows: Kamila Piskorz 40%, Justyna Litwinek 40%, Agnieszka Sitko-Lutek 20%.

Conflict of Interest

The authors declare no conflict of interest.

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