European Research Studies Journal
Volume XXVII, Issue S2, 2024

pp. 510-530

Impact of Business Environment Perception on Pro-Ecological Activities in Polish Firms

Submitted 08/10/24, 1st revision 20/11/24, 2nd revision 06/12/24, accepted 15/12/24

Jowita Trzcielińska[1], Renata Kaps[2]

Abstract:

Purpose: *Studies in sociology and scientific management indicate that the actions of people and organizations depend on how they perceive the changes taking place in their environment. The changes taking place create both threats and opportunities. Threats trigger defensive behaviour and opportunities trigger actions that lead to their exploitation. People and organizations, including enterprises, face the need to take pro-environmental actions. The purpose of this article is to deepen the understanding of the impact of perceptions of changes in the macroenvironment and industry environment on the pro-ecological decisions of medium and large sized enterprises.*

Design/Methodology/Approach: *There is an extensive literature on the benefits and barriers associated with pro-environmental transformation of enterprises. However, there are few publications on perceptions of changes in the environment and their relationship to "greening" activities of enterprises. Thus, there is a research and cognitive gap that we are trying to fill by verifying the hypothesis that a positive attitude to the changes taking place in the environment allows one to see opportunities in pro-environmental transformation processes. We verify this hypothesis through an empirical study, which was conducted in 150 medium and large enterprises operating in Poland. The data obtained were processed using the following tests: Spearman's rank correlation, Kruskal-Wallis ANOVA and multiple rank comparisons as well as descriptive statistics.*

correlation, Kruskal-Wallis ANOVA and multiple rank comparisons as well as descriptive statistics.

Findings: *Although we found that a positive attitude toward changes in the business environment encourages companies to make pro-ecological transformations, it is not perceived as a market opportunity. It is not reflected in positive business development trends. This transformation is rather forced by regulations regarding the Green Deal.*

Practical Implications: *Our research results indicate the importance of recognizing changes in the business environment. This is essential for discovering and creating market opportunities. In order to notice opportunities related to pro-ecological transformation among these changes, managers must more deeply recognize trends in buyers' expectations regarding sustainable products.*

Originality/Value: *Analysing for the first time how medium and large enterprises operating in Poland perceive changes in their environment and whether these observations impact implementing by them pro-ecological activities.*

[1]*Poznan University of Technology, Poland, ORCID: 000-0002-2115-5939,*
e-mail: jowita.trzcielinska@put.poznan.pl;
[2]*TU Wien, Austria, ORCID: 0000-0002-3364-9661, e-mail: renata.kaps@tuwien.ac.at;*

Keywords: *Circular economy, environmental sustainability, pro-ecological business strategies, opportunity recognition in environmental change.*

JEL Classification Codes: *Q53, Q56, Q57.*

Paper Type: *Research article.*

1. Introduction

The environment in which modern companies operate is highly variable and change is characterized by, among other things, discontinuity. Under such conditions, survival, growth and successful competition require either building resilience to change (resilience) or mechanisms for adapting to change. The extreme forms of resilience are the rigidity of the organizational system and its opposite - flexibility.

Rigidity provides resilience only up to a certain level of disruption coming from the environment, while flexibility refers to a feature of an organization's resources that allows it to take adaptation actions quickly while maintaining its integrity, core values, and identity. If adaptation activities are slower and involve deeper changes, and in this change, its integrity, identity, or core values may be altered, it takes the form of adaptability.

In order to take action to adapt to changes in the organization's environment, i.e., to build its resilience, flexibility, or adaptability, these changes must first be noticed. The reaction to the noticed changes depends on how they are perceived.

Among the numerous profound and discontinuous changes in the environment, examples of which include the effects of the Covid pandemic, wars, political conflicts, democracy crises, refugee crises, disrupted supply chains, political and trade sanctions, rapid development of technology, and the implementation of artificial intelligence, there are also challenges caused by climate change.

Pro-environmental measures, i.e., investments in sustainable practices and eco-friendly transformations, are becoming an integral part of business strategies. However, a key aspect of successfully adapting to the challenges that arise in connection with this transformation is how these changes are perceived. The issue of how perceptions of changes in the environment affect companies' pro-environmental activities marks an area of research that has not only theoretical significance, but also practical implications for business strategies and sustainability.

The purpose of this article is to deepen knowledge about the impact of the perception of changes in the macroenvironment and industry environment on the

pro-ecological decisions of medium and large companies, in particular those related to the transformation to the Circular Economy. In this regard, we hypothesize that a positive attitude toward changes in the business environment allows perceiving opportunities in pro-environmental transformation processes. This hypothesis is underpinned by the theories cited above that explain the relationship between perceptions of change and the behaviour of social groups and business decision-making. We verify it on the basis of empirical research conducted in 150 medium and large-sized enterprises operating in Poland.

We focus on companies operating in Poland for several reasons. First, according to the Green Future Index (MIT, 2023) in the ranking of 76 nations and territories on their ability to develop a sustainable, low-carbon future for their economies and societies, in 2023, Poland was ranked 21st and was at the forefront of 20 countries that are making progress or commitment toward building a green future, while in comparison to 2022 it worsened this position by 5 places.

Since the authors of the article have Polish citizenship, for obvious reasons they are interested in companies operating in their country. Second, access to data from companies operating in Poland is easier than accessing data from companies located abroad. Third, although conducting research on an international scale, e.g., on an EU scale, seems attractive, the scale of this research would have to be incomparably larger.

The authors did not have sufficient financial resources to conduct empirical research on a large scale. Fourth, we believe that larger-scale research should be comparative, i.e., conducted in different countries to capture specific differences in the perception of changes in the business environment and reactions to these changes. This would allow us to show common and country-specific factors. We intend to conduct such research in the future in cooperation with partner universities from four countries.

2. Literature Review

Due to the company's ability to cause events and thus create situations in the environment, it is divided into macro and industrial environment. This division is commonly used both in scientific publications and in various industry reports (David, 2011; Yuksel, 2012; Unilever, 2023; Trzcielinski *et al.,* 2023). The macro environment includes the following segments: political-legal, economic, socio-demographic and technological. These determine thFe overall structure of macro-environment analysis, known as PEST analysis.

Macro-environments affect industries and economic sectors, as well as the enterprises belonging to them. A single enterprise, on the other hand, has negligible ability to effect change in it. The industrial environment, on the other hand, includes (Porter, 1980): the supplier market, the customer market, companies interested in entering the sector, substitute products and competing companies. An enterprise,

depending on its location in the industrial environment and the potential it possesses, i.e., its resources in the broadest sense, has greater or lesser opportunities to influence its various segments or defend itself against threats from them, and thus participate in the sector's income and obtain a return on invested capital.

The above division of the environment into segments is one of the possible ones. In some strategic management publications, the macro environment is divided into five or even six segments. In particular, the distinction of five segments lies in the prominence of the environment. In this article, we divide the macro-environment into the following segments: Political and Legal (called together Regulatory), Economic, Social, Environmental, and Technological. For the industry environment, we limit ourselves to three basic segments: Customers, Suppliers, and Competitors.

There are numerous theories explaining the relationship between the perception of events and the reaction to them. With regard to social behaviour, this issue is explained by various theories developed in social psychology. Thus, for example, Social Identity Theory says that if changes are judged to cause a threat to the status of the groups to which people belong, such changes are met with resistance. On the other hand, when they are perceived as beneficial or enhancing the status of the group, they are supported (Tajfel and Turner, 1979).

According to the Loss Aversion Model, resistance can also be generated by changes where people expect to lose more than gain (Kahneman and Tversky, 1979). Balance Theory, on the other hand, explains that aversion and resistance to change can arise when it causes a loss of balance between an individual's beliefs and his or her group relationships (Heider, 1958). On the other hand, as indicated by the Expectancy-Value Theory, positive perception of changes may result from expected benefits, which in turn motivates positive behaviours (Fishbein and Ajzen, 1975).

The Normative and Informational Influence Theory explains that thanks to positive perception of changes, individuals can gain social acceptance or access to valuable information that others have (Deutsch and Gerard, 1955). The Self-Efficacy Theory indicates that positive perception of changes can strengthen an individual's sense of self-efficacy, i.e., the belief in one's own ability to cope with a given situation. This, in turn, can lead to more positive social behaviours (Bandura, 1977).

Perceptions of changes in the environment also influence business decisions of companies. It is explained by a number of theories developed in Scientific Management and Social Psychology. Thus, for example, Resource-Based View Theory emphasizes that how changes in the environment are perceived affects a company's strategic decisions to invest and restructure its resources since the uniqueness and value of these resources determine its competitive position (Barney, 1991).

Dynamic Capabilities Theory says that since organizations have the ability to adapt and renew themselves under dynamic changes in the environment, the perception of these changes determines whether these capabilities will be used in shaping its flexibility and innovation (Teeceet et al., 1997; Krzakiewicz and Cyfert, 2018).

Institutional Theory indicates that an organization's behaviour is influenced by external institutions. Changing perceptions of their role and the importance of this influence can lead to resistance to their influence or, on the contrary, to adaptive actions (DiMaggio and Powell, 1983).

The previously mentioned Expectancy-Value Theory states that people make decisions based on anticipated benefits. A negative appraisal of a situation prompts business decisions in favour of preserving the status quo, while a positive appraisal favours taking advantage of opportunities associated with the situation (Fishbein and Ajzen, 1975).

Change Resilience Theory assumes that organizations and individuals differ in their ability to adapt to change. Depending on how these changes are perceived then, organizations either oppose and resist them or, on the contrary, adapt to them through innovative actions (Holtet *et al.,* 2007). Diverse and variant perceptions of change are the basis of Scenario Planning - methods used for strategic analysis of organizations. In particular, they are used when changes are characterized by discontinuity. These methods allow the organization to prepare for various scenarios of anticipated changes (Trzcielinski *et al.,* 2023).

In each segment of the enterprise's environment, dynamic changes take place that affect the performance of the enterprise and thus trigger adaptive or defensive actions, including in the area of sustainability.

2.1 Regulatory Segment

Regulations are designed to force adaptation processes. In the European Economic Area, one of the most important packages of policy initiatives today is the European Green Deal (Communication COM/2019/640: The European Green Deal), which has the ambitious goal of transforming the European Union's economy into a modern, resource-efficient and competitive one.

Associated with its implementation are a number of initiatives addressing various sectors of the economy, as well as horizontal issues such as sustainable investment (Regulation EU, 2020/852), the Circular Economy (European Commission, 2020.), ESG non-financial information (Directive EU, 2022/2464) or sustainable finance (Communication from the Commission, 2023). The theoretical basis for triggering such adaptation processes is provided by the institutional theory and expectations-value theory mentioned in the introduction. Authors addressing this issue, on the one hand, point out that the transition to a circular economy (CE) is not only beneficial

for the environment (reduction of greenhouse gases), the economy (new jobs), but also creates an opportunity for companies, as it leads to a significant reduction in material costs (Employers' Group, 2016; Cavallo et al., 2017).

2.2 Economic Segment

As Berg (2018), Ocolișanu (2022), Tseng (2020), Wentworth and Burgon (2016) point out, the circular economy offers a number of economic benefits. These include more efficient management of resources, waste reduction and associated cost savings, and job creation. It also contributes to sustainable economic growth and improved well-being (Ocolișanu, 2022) by increasing income through a range of economic practices, such as buying used items, leasing or renting instead of owning.

It also enables sustainable consumption and production in multi-level supply chain systems (Tseng, 2020). However, the transition to a circular economy requires conscious, voluntary action, government intervention and international cooperation (Wentworth and Burgon, 2016).

2.3 Social Segment

The social dimension of the circular economy is a crucial but often overlooked aspect, as highlighted by Mies (2021). This dimension encompasses labour practices, human rights, and community well-being, and its integration is essential for a sustainable economic system. Bianchini *et al.* (2022) further emphasizes the need for a framework to assess social indicators in the context of circular business models, with a focus on various supply chain stakeholders.

Moreau *et al.* (2017) and Vayona and Demetriou (2020) underscore the importance of considering the social and institutional dimensions in the circular economy, with the former advocating for a focus on labour and governance, and the latter proposing an operating model for attribution in the context of circular economy strategies and policies.

These studies collectively highlight the need for a more comprehensive and integrated approach to the social aspect in the application of circular economic principles. On the other hand, as indicated by Padilla-Rivera et al. (2020), who, based on the analysis of 60 literature items on the social aspects of the circular economy, concluded that although the circular economy is promoted as a tool for sustainable development, its current structure does not seem to unequivocally support the social well-being of current and future generations.

At the same time, they noted that the studies by Moreau *et al.* (2017) and Vayon *et al.* (2020) together emphasize the need for a more comprehensive and integrated approach to the social aspect in the application of the principles of the circular economy.

2.4 Technological Segment

CE in the technology segment, as described by Camilleri (2018), offers significant benefits in terms of reducing the amount of resources consumed and waste generated (which must then be properly disposed of), reducing greenhouse gas emissions, harmful emissions and energy consumption.

The above-mentioned benefits can be achieved through more rational management of resources and the reuse of recovered resources that leads to increased operational efficiency and higher productivity.

Smart manufacturing represents a significant field for the implementation of innovative green technologies. It is associated with better cost efficiency and makes it possible to eliminate obsolete equipment (Schultz and Reinhardt, 2023).

Nevertheless, CE has some technological limitations. Schultz and Reinhardt cite the following challenges for the plastics industry: issues related to secondary material contamination, recycling processing, production processing, production material quality, and end-product quality.

These aspects are not unique to the plastics industry. For example, in the case of the paper industry, a limitation is the number of paper processing cycles due to the shortening of cellulose fibers. as well as the quality of the recycled product obtained. The latter issue refers also to several other recycled materials, the so-called "downcycling" problem, i.e., the production of products of "lower quality" from the recovered resources.

2.5 Suppliers Segment

The circular economy, a key element of a sustainable supply chain, brings economic and environmental benefits. Bhattacharjee and Cruz (2015) and Neto *et al.* (2007) emphasize that appropriate return policies and closed resource circulation can increase sales of both used and refurbished products, while mitigating negative environmental impacts throughout the supply chain. Winkler (2011) and Camilleri (2018) point to the potential to improve resource efficiency and operational productivity through responsible material management.

However, there are also challenges, such as the need for effective product design, taking into account “end of life” and "circularity of resources", and the use of marketing strategies to ensure demand for more environmentally friendly products or services (Bhattacharjee and Cruz, 2015).

The former is particularly difficult in the case of products with a long life cycle, for which the final disposal may sometimes be difficult to predict.

2.6 Customers Segment

Customers play a key role in the success of circular economy business models, and their purchasing intentions based on ethical values are a key factor (Mostaghel and Chirumalla, 2021). Therefore, it is important to promote the principles of sustainability and make the public aware of the importance of environmental issues and also their direct and indirect effects on health.

Involving consumers in the design process can lead to changes in purchasing patterns and product use, contributing to faster implementation of a circular economy (Knoskova, 2020). The positive image and perceived safety of products designed and manufactured in accordance with the principles of the circular economy are important, if not the most important factors influencing consumer acceptance (Wastling *et al.*, 2018; Calvo-Porral and Levy-Mangin, 2020).

2.7 Competitors Segment

Research on competitiveness in the circular economy reveals the complex interaction of many factors. Bimonte *et al.* (2021) highlight the role of R&D investment and collaboration in driving green innovation, while Munro (2023) emphasizes the potential of strategic implementation of closed-loop economy principles in strengthening the competitive position of manufacturing firms. Ly (2021) adds a layer of complexity by considering the impact of equity issues on green product design and supply chain performance.

Lahti *et al.* (2018) provide a theoretical foundation for understanding the implications of the closed-loop economy for profitability and competitiveness, emphasizing the need for further research in this area. Ly (2021) confirmed that in the apparel industry, CE can be a competitive advantage, especially in the context of internationalization. Such an advantage can strengthen the sustainability and resilience of companies (Munro, 2023).

The impact of CE implementation on competitiveness is also evident in the manufacturing sector, where it is linked to product/service innovation (Saari et al., 2022). These studies highlight the potential of the circular economy in shaping competitive advantages in various industries. However, it is important to mention that patents and trade secrets, an important source of competitive advantage for individual companies (Siderius and Zink, 2023), are also an important aspect blocking the implementation of CE solutions on a wider scale.

3. Research Methodology

The empirical research was conducted in 150 companies located in Poland, including 90 medium-sized and 60 large, belonging to 17 industrial sectors. Data was collected using an interview questionnaire with closed questionsusing the CAPI

(Computer-Assisted Telephone Interviewing) method. A return of 150 questionnaires was obtained. The respondents were, CEOs/Managing Directors, Technical Directors, and other managers with relevant competencies, and areas of responsibility.

The respondents were not divided by age or gender. Each of the surveyed companies answered 15 questions. The questions were asked in Polish. Their translation into English has no impact on the results of the analyses presented in this article. The questions were divided into four groups of variables. The answers were given on a five-point Likert scale. The reliability of the measurement scales was checked using Cronbach's alpha test.

The first group consists of independent variables that relate to perceptions of changes occurring in five segments of the macro environment (Iv1: Regulatory, Iv2: Economic, Iv3: Socio-demographic, Iv4: Natural environment, Iv5: Technological; Cronbach's alpha=0.86) and three segments of the industrial environment (Iv6: Customers, Iv7: Suppliers, Iv8: Competitors; Cronbach alpha = 0.84). Possible responses were: 1 - very unfavourable; 2- unfavourable; 3- neutral; 4- favourable; 5- very favourable.

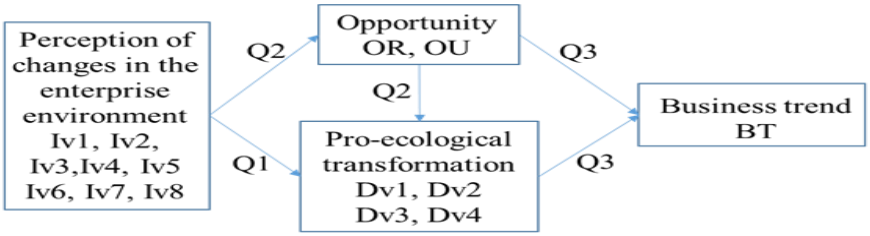
The second group consists of four dependent variables relating to environmentally friendly activities (Dv1: Replacing harmful with environmentally friendly technologies, Dv2: Using own wastes in own other processes, Dv3: Using our wastes by other companies, Dv4: Wastes neutralization; Cronbach's alpha=0.79). Respondents indicated the extent to which pro-ecological activities are implemented: 1- are not implemented at all; 2- to a very small extent; 3- moderately; 4- to a large extent; 5- to a very large extent.

The third group is formed by two variables related to changes in the number of market opportunities perceived and used (OR: We recognize opportunities, OU: We use opportunities; Cronbach's alpha=0.85). Respondents were expected to indicate whether, relative to earlier periods, including before the Covid 19 pandemic, opportunities are: 1- much less; 2- less; 3-no difference; 4- more; 5- much more. The fourth group is one-element and is formed by variable BT referring to the company's business development trend. The possible evaluations of this trend were: 1- Negative, 2- stagnation; 3- acceptable but not satisfactory; 4- good - satisfactory; 5- very good.

The research model is presented in Figure 1. The model is directed at verifying the hypothesis posed in the introduction by answering the following questions:

(Q1) Does a positive perception of changes in the environment induce pro-environmental transformation?
(Q2) Is pro-environmental transformation a market opportunity?
(Q3) Are these opportunities mapped in the business trends of companies?

Figure 1. *Research Problem*



Source: *Authors' elaboration.*

In order to determine whether there are statistically significant relationships between variables, the Spearman's rank correlation test was performed. For variables that are statistically significantly correlated, the Kruskal-Wallis test and the multiple comparison rank test were performed. The Kruskal-Wallis ANOVA test is a nonparametric test of variance analysis.

It allows to determine whether there is at least one pair of groups of values of the independent (grouping) variable that give different statistically significant values of the median of the dependent variable. On the other hand, the multiple comparison rank test identifies such pairs. As a result, the ranks of the independent variable that have a different effect on the median ranks of the dependent variable are identified.

To determine what medians of the ranks of the dependent variable Dv are the result of the values of the independent (grouping) variables, a descriptive statistics test was performed. The value of the dependent variable is the median of its values obtained in the studies for a given group (rank) of the independent variable.

4. Research Results

Since the interview questionnaire was answered on a five-point Likert rank scale, with 1 and 2 representing very low and low ratings, 3 representing neutral, and 4 and 5 representing high and very high ratings, respectively, the cumulative frequency of responses for the combined ranks (1 and 2) and (4 and 5) are given in Tables 1, 2, 3 to capture the clear difference between low and high ratings.

In general, changes in the business environment are perceived negatively (Table 1). In medium-sized enterprises, changes in the segments: regulatory (Iv1), economic (Iv2), and social (Iv3) are more often perceived negatively (75.6%, 57.8%, 33.3%, respectively) than positively (13.3%, 26.7%, 17.8%, respectively). In large enterprises, such an assessment also applies to changes in the natural environment (Iv4) (28.3% vs. 21.7%).

In the case of the technological segment, positive assessments of changes dominate, although in medium-sized companies they are more unambiguous than in large enterprises (44.4% and 28.3%, respectively). Also in the case of the industrial

environment, in medium-sized enterprises, negative assessments dominate. This applies to changes in the customer market (Iv6 – 48.9% vs. 43.3%), suppliers (Iv7 – 48.9% vs. 44.4%) and competitors (Iv8 – 55.6% vs. 34.4%), with the first two segments showing more balanced assessments. In large enterprises, only changes in the competitor segment (Iv8) are perceived more negatively than positively (36.7% vs. 21.7%).

Table 1. *Perception of Changes Taking Place in the Macro-Environment and Industrial Environment (%)*

Size	Range	Macroenvironment					Industry environment		
		Iv1	Iv2	Iv3	Iv4	Iv5	Iv6	Iv7	Iv8
M	1-2	75.6	57.8	33.3	16.7	21.1	48.9	48.9	55.6
	3	11.1	15.6	48.9	56.7	34.4	7.8	6.7	10.0
	4-5	13.3	26.7	17.8	26.7	44.4	43.3	44.4	34.4
		100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
L	1-2	70.0	53.3	48.3	28.3	25.0	23.3	23.3	36.7
	3	13.3	28.3	35.0	50.0	30.0	26.7	26.7	41.7
	4-5	16.7	18.3	16.7	21.7	28.3	50.0	50.0	21.7
		100.0	100.0	100.0	100.0	83.3	100.0	100.0	100.0

Source: *Authors' calculations.*

Among the dependent variables, in medium-sized enterprises, no or very small involvement in pro-ecological activities is more common than large or very large involvement (Table 2). This concerns, Dv1: Replacing harmful with environmentally friendly technologies (35.6% vs. 28.9%), Dv2: Using own wastes in own other processes (44.4% vs. 12.2%), Dv3: Using our wastes by other companies (48.9% vs. 18.9%). This proportion is only reversed in the scope of Dv4: Wastes neutralization (22.2% vs. 38.9%).

In large enterprises the situation is better and, except variable Dv2 in which low involvement is relatively balanced with high involvement (25.0% and 23.3%, respectively), in the case of the remaining variables (Dv1, Dv3, Dv4) low and high involvement occur less often than high involvement (15.0% vs. 45.7%; 30% vs. 40%; 18.3% vs. 48.3%, respectively).

Table 3 presents the trend of change in the number of perceived and used opportunities and the trend of enterprise development in business terms. These trends also cover the period before the Covid 19 pandemic.

In general, in medium-sized enterprises, the frequency of the judgment that the number of recognized opportunities (OR) is smaller (37.8%) remains in relative balance with the judgment that it is larger (35.6%). A similar proportion is also

present in the scope of large seized opportunities (OU). It amounts to 37.8% and 33.3%, respectively.

Table 2. *Involvement in Pro-Ecological Activities (%)*

Size	Range	Pro-ecological activities			
		Dv1	Dv2	Dv3	Dv4
M	1-2	35.6	44.4	48.9	22.2
	3	35.6	43.3	32.2	38.9
	4-5	28.9	12.2	18.9	38.9
		100	100	100	100
L	1-2	15.0	25.0	30.0	18.3
	3	38.3	51.7	30.0	33.3
	4-5	46.7	23.3	40.0	48.3
		100	100	100	100

Source: *Authors' calculations.*

Table 3 presents the trend of change in the number of perceived and used opportunities and the trend of enterprise development in business terms. These trends also cover the period before the Covid 19 pandemic.

In general, in medium-sized enterprises, the frequency of the judgment that the number of recognized opportunities (OR) is smaller (37.8%) remains in relative balance with the judgment that it is larger (35.6%).

A similar proportion is also present in the scope of large seized opportunities (OU). It amounts to 37.8% and 33.3%, respectively. On the other hand, in large enterprises, both in the scope of OR and OU, a positive trend clearly dominates (20% vs. 45% and 15% vs. 46.7%, respectively). Taking into account the trend of business development (BT), positive judgments dominate much more often, both in medium-sized and large enterprises.

In particular, it is worth noting that both in medium-sized and large enterprises, the largest increase in the number of opportunities recognized (OR) goes hand in hand with a positive assessment of the BT business development trend (28.9% and 35.0%, respectively). A similar pattern occurs in the relationship between the increase in the number of opportunities used (OU) and BT (27.8% and 35.0%, respectively).

The frequency of respondents' answers makes it possible to note general trends in the perception of changes in the environment and recognition of opportunities. However, they are not sufficient to answer the research questions posed. The basis for answering these questions is Spearman's rank correlation (Table 4).

***Table 3**. Trend in the Perception and Use of Market Opportunities and Company Business Development (%)*

Size	Business trend perception	Opportunity recognition (OR)				Opportunity use (OU)			
	Range	1 - 2	3	4 - 5	Together	1 - 2	3	4 - 5	Together
M	1-2	13.3	3.3	1.1	17.8	13.3	2.2	2.2	17.8
	3	13.3	7.8	5.6	26.7	14.4	8.9	3.3	26.7
	4-5	11.1	15.6	28.9	55.6	10	17.8	27.8	55.6
	Together	37.8	26.7	35.6	100	37.8	28.9	33.3	100
L	1-2	3.3	0	1.7	5	3.3	0	1.7	5
	3	10	15	8.3	33.3	8.3	15	10	33.3
	4-5	6.7	20	35	61.7	3.3	23.3	35	61.7
	Together	20	35	45	100	15	38.3	46.7	100

***Source:** Authors' calculations.*

With the exception of the variable *Dv4: Wastes neutralization*, all other dependent variables are positively and statistically significantly correlated with at least six independent variables on perceptions of changes in enterprises' environment. For each of the pro-environmental measures: *Dv1: Replacing harmful with environmentally friendly technologies*, *Dv2: Using own wastes in own other processes*, *Dv3: Using our wastes by other companies*, is influenced by positive perceptions of changes in the following segments of the environment: *Iv1: Regulatory*, *Iv2: Economic*, *Iv3: Socio-demographic*, *Iv6: Customers*, *Iv7: Suppliers and Iv8: Competitors*. The only variable that is not correlated with any environmental measure is *Iv5: Perception of change in the technological segment of the macro-environment*.

***Table 4.** Spearman's Rank Correlation*

Variable	Iv1	Iv2	Iv3	Iv4	Iv5	Iv6	Iv7	Iv8	OR	OU	BT
OR	**0.3796**	**0.3145**	**0.3508**	**0.4928**	**0.5500**	**0.4662**	**0.4706**	**0.3027**	1.0000	**0.7746**	**0.4936**
OU	**0.4634**	**0.4134**	**0.4800**	**0.4987**	**0.5749**	**0.4856**	**0.4952**	**0.3821**	**0.7746**	1.0000	**0.5073**
Dv1	**0.3226**	**0.3320**	**0.2381**	**0.1986**	0.0793	**0.3454**	**0.3430**	**0.2215**	**0.1711**	**0.1657**	0.1382
Dv2	**0.2985**	**0.3388**	**0.2845**	**0.1816**	0.0867	**0.2866**	**0.2880**	**0.2758**	0.1140	**0.1743**	-0.0057
Dv3	**0.2656**	**0.2879**	**0.2091**	0.1531	0.0371	**0.2328**	**0.2336**	**0.2525**	0.0628	0.1443	-0.0426
Dv4	0.0749	0.0082	0.0129	-0.0404	0.1448	-0.0609	-0.0636	0.0336	0.0699	**0.1614**	**0.2517**
BT	**0.2985**	**0.2629**	**0.2618**	**0.3160**	**0.4774**	**0.3100**	**0.3135**	0.0312	**0.4936**	**0.5073**	1.0000

***Note:** Bold red font indicates a statistically significant correlation with $p<0.05$*
***Source:** Authors' calculations.*

With the exception of *Dv1: Replacing harmful with environmentally friendly technologies*, the remaining environmental activities are not correlated with *OR: We recognize opportunities*. On the contrary, with the exception of *Dv3: Using our*

wastes by other companies are statistically significantly and positively correlated with *OU: We use opportunities*. Both *OR* and *OU* are statistically significantly and positively correlated with each variable of perception of changes occurring in the business environment (*Iv1 - Iv8*).

For variables with a statistically significant correlation, the Kruskal-Wallis test was performed, which showed that there are pairs of groups of the independent variable that differ in their impact on the dependent variable. These groups were identified using the multiple comparison test. The pairs of these differing groups are shown in the columns of Table 5.

The interpretation of the values (ranks) of the independent variables and the names of the dependent variables Dv are given in section 3.1 presenting the research methodology. For example, in segment Iv1, perceiving changes as "very unfavourable" has a different effect on the dependent variable Dv1 "Replacing harmful with environmentally friendly technologies" than perceiving changes as "neutral" (pair 1-3).

The same applies to the variable Dv2 "Using own wastes in own other processes. " Remaining with the example of the variable Iv1, all pairs that differ in their effect on the variable Dv1 are: 1-3, 1-4, 2-3, 2-4. The remaining pairs of values of the variable Iv1 do not differ in their effect on the variable Dv1.

Table 5. *Pairs of Groups of Independent Variable Iv that Differ in the Median of Ranks of the Dependent Variable Dv*

Variable	Perception of changes in segments of the environment: Iv												
	Iv1: regulatory segment							Iv2: economic segment				
	1-3	1-4	1-5	2-3	2-4	3-4	4-5	1-3	1-4	1-5	2-3	2-4
Dv1	x	x		x	x						x	x
Dv2	x	x							x			x
Dv3		x										
	Iv3: socio-demographic segment							Iv4: natural environment				
	1-3	1-4	1-5	2-3	2-4	3-4	4-5	1-3	1-4	1-5	2-3	2-4
Dv1												
Dv2		x				x						
	Iv5: technological segment							Iv6: buyers segment				
	1-3	1-4	1-5	2-3	2-4	3-4	4-5	1-3	1-4	1-5	2-3	2-4
Dv1							x	x	x	x		
Dv2								x	x		x	
	Iv7: suppliers segment							Iv8: competitors segment				
	1-3	1-4	1-5	2-3	2-4	3-4	4-5	1-3	1-4	1-5	2-3	2-4
Dv1	x	x	x					x		x		
Dv2	x	x		x				x		x		
Dv3	x		x	x				x		x		

Source: *Authors' calculations.*

Table 6 shows the results of the descriptive statistics test, which allowed to identify those values (groups) of the independent variable Iv, which gives the highest median of the dependent variable Dv. For example, the highest value achieved by the dependent variable Dv1: Replacing harmful with environmentally friendly technologies is 4.0, and the following values of the independent variables lead to it: Iv1 (3; 4), Iv2 (5), Iv3 (4), Iv6 (3; 5), Iv7 (3; 5), Iv8 (5).

Table 6. *Groups of the Independent Variable Giving the Highest Median for the Dependent Variable*

Dependent variable		Independent (grouping) variables - perception of the enterprise environment							
		Iv1	Iv2	Iv3	Iv4	Iv5	Iv6	Iv7	Iv8
No	Max value (median)	Groups of the independent variable giving the highest value for the dependent variable							
Dv1	4,0	3; 4	5	4	4; 5	x	3; 5	3; 5	5
Dv2	3,0	2; 3; 4	2; 3; 4; 5	2; 3; 4	1; 3; 4; 5	2; 3; 4	3; 4; 5	3; 4; 5	2; 3; 4; 5
Dv3	4,0	x	x	x	x	x	3; 4	3; 5	5
Dv4	4,5	x	x	x	x	5	x	x	x

Source*: Authors' calculations.*

As can be seen in Table 6, no dependent variable reaches a value of 5, indicating involvement in environmentally friendly activities "to a very large extent". The highest value taken by the variable *Dv1: Replacing harmful with environmentally friendly technologies* is 4.0, indicating commitment "to a large extent".

Such commitment is primarily fostered by the perception that changes in the *Economic (Iv2)*, *Natural environment (Iv4)*, *Customers (Iv6)*, *Suppliers (Iv7)* and *Competitors (Iv8)* segments are "very favourable" (5). The same involvement corresponds to perceptions of change in the segments: *Regulatory (Iv1)*, *Socio-demographic (Iv3)*, *Natural environment (Iv4)*, as favourable (4).

The widest spectrum of perceptions of change (mostly 2,3,4,5) occurring in all eight segments of the environment (*Iv1-Iv8*) corresponds to "moderate involvement" (3) in the use of the company's waste in its processes other than those from which the waste originated (*Dv2*). On the one hand, this value is relatively easily attainable and, as such, may be the result of continuous improvement, while on the other hand, it is low. The low value may be an expression of the difficulties which companies face in making structural, technological, and material changes in order to more fully implement an internal circular economy.

Involvement in the "use of our waste by other companies" (Dv3) occurs to a large extent (4). It corresponds to the perception that changes in the supplier (Iv7), and competitor (Iv8) segments are "very favourable" (5). Such involvement can produce favourable results when suppliers are interested in reusing materials, or when other companies gain a competitive advantage because they can effectively sell their waste materials. In contrast, a "neutral" (3) perception of change in the customers segment

(Iv6) is sufficient for a level (4) commitment when "weak signals" are seen that customer preferences are shifting toward recycled products.

The highest level of commitment (4,5) is for "waste neutralization"(Dv4). Such a level is achievable only when changes in the "technological segment" (Iv6) are perceived as "very favourable"(5). This situation occurs when companies have broad access to waste neutralization technologies. Practices such as illegal landfills, exporting waste to underdeveloped countries, drowning waste in the seas and oceans, or incinerating it in a way that poisons the environment prove that the problem of waste neutralization is a major technological challenge.

5. Discussion

The research carried out did not confirm what was hypothesized, that a positive attitude toward changes in the environment of businesses allows them to see opportunities in pro-environmental transformation processes.

Although a positive answer to the first research question Q1 was obtained, namely, that such attitudes toward change prompt companies to make pro-environmental transformations, but this does not mean that these transformation efforts are perceived as opportunities (research questions Q2 and Q3).

Positively perceived changes in segments of the macro-environment and industrial environment are drivers of pro-environmental transformation but companies do not engage in these activities to a very large extent, and engagement to a large extent also requires a positive attitude.

More often, however, these changes are perceived as unfavourable, both by medium-sized and large companies. The results we obtained are, therefore, closer to those presented by other authors, pointing to barriers to pro-environmental transformation.

These barriers are related to higher costs (Avdeeva *et al.*, 2021), the ambiguity of the impact of CE on the well-being of future generations (Padilla-Rivera *et al.*, 2020), lower quality of products made from recycled and waste materials (Schultz and Reinhardt, 2023), challenges in designing products from secondary materials (Bhattacharjee and Cruz, 2015), and limited access to CE patents and trade secrets through which companies maintain a competitive advantage (Siderius and Zink, 2023).

Interpreting the results of our research, we pointed out that engaging in pro-environmental transformation activities is enforced by Green Deal regulations and buyers' preference for green products. Moreover, the better a company's economic situation and stronger position relative to suppliers and competitors, the more it engages in transformation processes.

Our interpretation is speculative because we have not studied what influences the perception of changes in the business environment. However, it is reasonable in light of psychological theories of social behaviour and, with regard to business – theories developed on the basis of scientific management.

Positive perception of changes in the environment is conducive to taking pro-environmental actions. It seems to be the result of the synergistic effect of positive orientation and life optimism, i.e., cognitive traits, as well as situational conditions of the enterprise, including the effectiveness of its management system.

The results of our study have some limitations. The survey was conducted in December 2022 and thus before the World Health Organization formally announced the end of the Covid 19 pandemic, which took place in May 2023. Restrictions on social life and business began in 2020. Although in our research we asked respondents about trends in changes in the environment even before the pandemic period, it cannot be ruled out that their answers were influenced by the annoyances of that period.

The second limitation is also related to the time horizon of the surveys conducted. In 2022, the level of public awareness of the dangers that human and industrial activities pose to the environment was lower than today. Also lower than today was the knowledge in companies about the concept of Environmental, Social, and Governance (ESG) and, in particular, the degree of implementation of actions enforced by ESG was lower. These circumstances mean that the results of our study are rather about the historical state, and their extension to the current state must be very cautious.

6. Conclusions

The study indicates that positive perceptions of the business environment promote pro-ecological changes in Polish firms, yet these changes are often compliance-driven rather than strategically advantageous. Significant barriers, including high costs and limited access to necessary resources, hinder full engagement in sustainable practices, reflecting an overall hesitancy to integrate such approaches into business strategies.

Furmore companies with stronger economic positions are more inclined to pursue green initiatives, suggesting that financial stability and strategic leverage are crucial for ecological transformations; however, many enterprises only exhibit moderate engagement with circular economy practices due to structural and technological challenges.

The research explores how perceptions of the business environment relate to business trends, noting that while positive perceptions align with some pro-ecological measures, they do not yield substantial competitive advantages,

highlighting the regulatory nature of these transformations. The authors recognize limitations stemming from the study's timing during the COVID-19 pandemic, which may have affected findings, and suggest future research should include cross-country analyses to better understand the diverse factors influencing pro-ecological transformations.

What important within study the intricacies of incorporating sustainability into business strategies were proven and thus within the paper challenges and opportunities faced by medium and large enterprises in adopting pro-ecological practices were highlithed.

References:

Avdeeva, E., Davydova, T., Makeeva, T., Korovkina, E. 2021. Conceptual features of the circular economy and the possibilities of its formation using smart systems. E3S Web of Conferences 244, 10012, EMMFT-2020. https://doi.org/10.1051/e3sconf/202124410012.

Barney, J.B. 1991. Firm resources and sustained competitive advantage. Journal of Management, 17(1), 99-120. https://doi.org/10.1177/014920639101700108.

Berg, A., Antikainen, R., Hartikainen, E., Kauppi, S., Kautto, P., Lazarevic, D., Piesik, S., Saikku, L. 2018. Circular economy for sustainable development. Reports of the Finnish Environment Institute 26, 2018. Available at: https://helda.helsinki.fi/server/api/core/bitstreams/75f6f473-a071-4340-b096-dbb2da1d13b5/content. Bhattacharjee, S., Cruz, J.M. 2015. Economic sustainability of closed loop supply chains: A holistic model for decision and policy analysis. https://doi.org/10.1016/j.dss.2015.05.011. Available at: https://www.sciencedirect.com/science/article/abs/pii/S0167923615001128.

Bianchini, A., Guarnieri, P., Rossi, J. 2020. A framework to assess social indicators in a circular economy perspective. Sustainability, 14(13), 1-21. https://doi.org/10.3390/su14137970.

Bimonte, G., Romano, M., Russolillo, M. 2021. Green innovation and competition: R&D incentives in a circular economy. Games, 12(3), 68. https://doi.org/10.3390/g12030068. Available at: https://www.mdpi.com/2073-4336/12/3/68.

Calvo-Porral, C., Lévy-Mangin, J.P. 2020. The circular economy business model: Examining consumers' acceptance of recycled goods. Administrative Sciences, 10(2), 28. https://doi.org/10.3390/admsci10020028. Available at: https://www.mdpi.com/2076-3387/10/2/28.

Camilleri, M. 2018. The circular economy's closed loop and product service systems for sustainable development: A comprehensive review and appraisal. Sustainable Development, 27, Issue 3, 530-536. https://doi.org/10.1002/sd.1909. Available at: https://onlinelibrary.wiley.com/doi/epdf/10.1002/sd.1909.

Cavallo, M., Cencioni, D., Stacchini, V. 2017. Environmental, social and economic benefits of the transition from a linear to a circular economy. (Eds.) M. Cavallo, D. Cencioni, Edizioni circular economy, benefits and good practices. Ambiente srl, Milano.

Communication COM/2019/640: The European Green Deal.

Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, A sustainable finance framework that works, COM(2023), 317.

David, F.R. 2011. Strategic management. Concepts and cases. Boston: Prentice Hall.

Deutsch, M., Gerard, H.B. 1955. A study of normative and informational social influences upon individual judgment. The Journal of Abnormal and Social Psychology, 51(3), 629-636. https://doi.org/10.1037/h0046408.

DiMaggio, P.J., Powell, W.W. 1983. The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields. American Sociological Review, 48(2), 147-160. DOI: 10.17323/1726-3247-2010-1-34-56.

Directive EU 2022/2464 of the European Parliament and of the Council of December 14, 2022 amending Regulation (EU) No. 537/2014, Directive 2004/109/EC, Directive 2006/43/EC and Directive 2013/34/EU with regard to corporate sustainability reporting.

Employers' Group. 2016. Closed-loop economy: Beneficial for all. The triple challenge: Climate change, competitiveness and dependence on raw materials. European Economic and Social Committee, Visits and Publications Unit, Brussels.

European Commission. 2020. Roadmap for a Closed Circuit Economy. For a cleaner and more competitive Europe. Luxembourg: Publications Office of the European Union.

Fishbein, M., Ajzen, I. 1975 Belief, attitude, intention, and behavior: An introduction to theory and research. Reading, MA, Addison-Wesley.

Heider, F. 1958. The psychology of interpersonal relations. New York, Wiley.

Holt, D.T., Armenakis, A.A., Feild, H.S., Harris, S.G. 2007. Readiness for organizational change: The systematic development of a scale. The Journal of Applied Behavioral Science, 43(2), 232-255. https://doi.org/10.1177/00218863062952.

Kahneman, D., Tversky, A. 1979. Prospect theory: An analysis of decision under risk. Econometrica, 47(2), 263-291. https://doi.org/10.2307/1914185.

Knoskova, L. 2020. Circular design and consumer involvement in circular economy. Studia Commercialia Bratislavensia, Sciendo, 13(43), 25-34. DOI: 10.2478/stcb-2020-0001. Available at: https://ideas.repec.org/a/vrs/stcomb/v13y2020i43p25-34n2.html.

Krzakiewicz, K. Cyfert, S. (Eds.). 2018. Dynamiczne zdolności polskich przedsiębiorstw. Poznan: Towarzystwo Naukowe Organizacji i Kierownictwa. Dom Organizatora, p. 132.

Lahti, T., Wincent, J., Parida, V. 2018. A definition and theoretical review of the circular economy,, Value creation, and sustainable business models: Where are we now and where, should research move in the future? Sustainability, 10(8), 2799. https://doi.org/10.3390/su10082799.

Ly, B. 2021. Competitive advantage and internationalization of a circular economy model in apparel multinationals. Cogent Business & Management, 8(1). https://doi.org/10.1080/23311975.2021.1944012.

Mies, A., Gold, S. 2021. Mapping the social dimension of the circular economy. Journal of Cleaner Production, 321, 128960. https://doi.org/10.1016/j.jclepro.2021.128960.

MIT. 2023. The Green Future Index 2023. MIT technology review insights, Available at: https://www.technologyreview.com

Moreau, V., Sahakian, M., Griethuysen, P., Vuille, F. 2017. Coming full circle: Why social and institutional dimensions matter for the circular economy. Journal of Industrial Ecology, 21(3), 497-506. https://doi.org/10.1111/jiec.12598.

Mostaghel, R., Chirumalla, K. 2021. Role of customers in circular business models. Journal of Business Research,127, 35-44. https://doi.org/10.1016/j.jbusres.2020.12.053.

Available at: https://www.sciencedirect.com/science/article/pii/S0148296320308821.

Munro, M.J. 2023. Assessing the impact of strategic implementation of circular economy on the competitive advantage of canadian manufacturing firms. Journal of Strategic Management Environmental Science, Business, Economics,7(3), 1-10. DOI: https://doi.org/10.53819/81018102t4143. Available at: https://www.stratfordjournal.org/journals/index.php/journal-of-strategic-management/article/view/1530.

Neto, J., Walther, G., Bloemhof, J., Van Nunen, J., Spengler, T. 2007. From closed-loop to sustainable supply chains: the WEEE case. International Journal of Production Research, 48(15). https://doi.org/10.1080/00207540902906151. Available at: https://www.tandfonline.com/doi/full/10.1080/00207540902906151.

Ocolişanu, A., Dobrota, G., Agarbiceanu, M.S. 2022. The implications of the circular economy on sustainable economic growth. Managing Sustainable Development, Journal, 14(1), 16-21. DOI: 10.54989/msd-2022-0003. Available at: https://elicit.com/?workflow=table-of-papers&run=e4644242-129e-4df8-80bf-d89c767e5b95.

Padilla-Rivera, A., Russo-Garrido, S., Merveille, N. 2020. Addressing the social aspects of a circular economy: A systematic literature review. Sustainability, 12(19), 7912. https://doi.org/10.3390/su12197912.

Porter, M.E. 1980. Competetive strategy. Techniques for analyzing industries and competitors. Free Press, New York.

Regulation EU 2020/852 of the European Parliament and of the Council of 18 June 2020 establishing a framework to facilitate sustainable investment, amending Regulation (EU) 2019/2088).

Saari, U.A., Schneider, M., Damberg, S., Herstatt, C., Lanz, M., Aarikka-Stenroos, L., Ringle, C. 2022. The influence of circular economy implementation on competitiveness in manufacturing companies. IEEE 28th International Conference on Engineering, Technology and Innovation (ICE/ITMC) & 31st International Association For Management of Technology (IAMOT) Joint Conference. DOI: 10.1109/ICE/ITMC-IAMOT55089.2022.10033154. Available: https://ieeexplore.ieee.org/document/10033154.

Schultz, F.C., Reinhardt, R.J. 2023. Technological challenges and opportunities to plastics valorization in the context of a circular economy in Europe, Sustainability, 15(4), 3741. DOI: 10.3390/su15043741.

Siderius, T., Zink, T. 2023. Markets and the future of the circular economy. Circular Economy and Sustainability, 3, 1569-1595. https://doi.org/10.1007/s43615-022-00196-4. Available at: https://link.springer.com/article/10.1007/s43615-022-00196-4.

Tajfel, H., Turner, J.C. 1979. An integrative theory of intergroup conflict. In W. G. Austin, & S. Worchel (Eds.). The Social Psychology of Intergroup Relations. Monterey, Brooks/Cole, 33-47.

Teece, D.J., Pisano, G., Shuen, A. 1997. Dynamic capabilities and strategic management. Strategic Management Journal, 18(7), 509-533. https://doi.org/10.1002/(SICI)1097-0266(199708)18:7<509::AID-SMJ882>3.0.CO;2-Z.

Trzcieliński S., Kruszyński, M., Trzcielińska, J. 2023. Shaping the enterprise's strategy – Theory and practice. Poznan: Publishing House of Poznan University of Technology, p. 342. Available at: https://wydawnictwo.put.poznan.pl/books/isbn_978-83-7775-718-5.

Tseng, M., Chiu, A., Liu, G., Jantaralolica, T. 2020. Circular economy enables sustainable consumption and production in multi-level supply chain system. Environmental Science, Economics Resources Conservation and Recycling. https://doi.org/10.1016/j.resconrec.2019.104601. Available at: https://www.sciencedirect.com/science/article/abs/pii/S0921344919305075.

Unilever PESTLE Analysis 2023. Business marketing strategy. Bmarketingstrategy.com.

Vayona, A., Demetriou, G. 2020. Towards an operating model for attribution in circular economy. 16th International Conference on Distributed Computing in Sensor Systems (DCOSS), Marina del Rey, CA, USA, 490-495. Available at: https://ieeexplore.ieee.org/document/9183531.

Wastling, T., Charnley, F., Moreno, M. 2018. Design for circular Bbehaviour: Considering users in a circular economy. Sustainability, 10(6), 1743. https://doi.org/10.3390/su10061743. Available at: https://www.mdpi.com/2071-1050/10/6/1743.

Wentworth, J., Burgon, J. 2018. Circular businesses - Benefits, approaches and challenges. In: Designing a circular economy. (Eds. Martin Charter). Routledge.

Winkler, H. 2011. Closed-loop production systems – A sustainable supply chain approach. Journal of Manufacturing Science and Technology, 4(3), 243-246. https://doi.org/10.1016/j.cirpj.2011.05.001. Available at: https://www.sciencedirect.com/science/article/abs/pii/S1755581711000460.

Yuksel, I. 2012. Developing a multi-criteria decision making model for PESTEL analysis. International Journal of Business and Management, 7(24), 52-66. doi:10.5539/ijbm.v7n24p52.