SILESIAN UNIVERSITY OF TECHNOLOGY PUBLISHING HOUSE

SCIENTIFIC PAPERS OF SILESIAN UNIVERSITY OF TECHNOLOGY 2025
ORGANIZATION AND MANAGEMENT SERIES NO. 223

ANTICIPATING ESG TRANSITIONS IN POLISH LOGISTICS: A SPECULATIVE AND DESIGN FUTURES-BASED SCENARIO STUDY

Marzena PAPIERNIK-WOJDERA[1*], Anna MISZTAL[2]

[1] Faculty of Economics and Sociology, University of Lodz; marzena.papiernik@uni.lodz.pl,
ORCID: 0000-0002-2872-0881
[2] Faculty of Economics and Sociology, University of Lodz; anna.misztal@uni.lodz.pl,
ORCID: 0000-0002-7455-5290
* Correspondence author

Purpose: The paper will analyze possible directions of ESG changes in the Polish logistics industry in the next decade. We use Design Futures methods and typological speculative thinking. The article seeks to project other ways of fixed evolution paths that can promote the sector's sustainable development.
Design/methodology/approach: The study uses a qualitative foresight approach combining Design Futures and speculative scenario writing techniques. The analysis consists of a literature review, secondary data and an analysis of ESG trends in logistics. Based on the above, three scenarios of the future of the Polish logistics sector were developed.
Results: Based on the analysis, three scenarios of ESG development in the Polish logistics sector were presented: "Compliance" scenario - ESG as a requirement forced by formality, minimal integration; "Transformation" scenario - full integration of ESG in the strategy of logistics companies; Scenario "Innovation" - ESG as a source of innovation and competitive advantage. All the scenarios assess the sector's potential economic, social and environmental implications.
Research limitations/implications: The research is based on assessing secondary data and qualitative evaluation of trends, which may involve limiting the competence of generalizing the results. We based our findings on secondary data analysis and qualitative assessment of trends, which may include determining the potential of generalizing the findings. Further research can be based on empirical quantitative data or training of logistics stakeholders in the industry.
Practical implications: The research results can help managers and decision-makers plan logistics ESG strategy. Scenarios are a method of exploring possible development trajectories. We identify opportunities and challenges in ESG implementation in logistics in Poland.
Social implications: ESG integration in logistics can assist in raising corporate social responsibility, improving working conditions and reducing negative environmental impact. The scenarios provide insight into how different ESG approaches can impact Poland's society and environment.
Originality/value: This article is the first to apply a design futures and speculative approach to ESG in logistics. It offers a new future for researchers, managers, and decision-makers interested in long-term sustainability planning in the logistics sector.

Keywords: ESG, logistics sector, design futures, speculative scenarios, sustainability development.
Category of the paper: research paper.

1. Introduction

The modern economy requires companies to conduct their business responsibly and sustainably. The ESG (Environmental, Social and Governance) concept is becoming the basis for non-financial reporting (Kimbrough et al., 2022; Chopra et al., 2024). Its implementation is essential for risk management and building trust among investors. It is imperative in sectors with high emissions and energy intensity. From this point of view, the logistics sector is at the centre of interest for decision-makers, investors, and public opinion in the context of ESG transformation (Friedman et al., 2021).

At the EU level, regulations such as the Corporate Sustainability Reporting Directive (CSRD), the EU Taxonomy, and Fit for 55 have significantly increased pressure on companies to embed ESG principles in strategic and operational planning. Globally, ESG is evolving from a voluntary reporting tool into a core requirement for access to capital and public legitimacy.

In recent years, ecological initiatives such as the implementation of low-emission fleets, the construction of environmental warehouses or non-financial reporting have been visible in the logistics sector in Poland. In the meantime, most companies, especially SMES, see ESG as a costly and vague administrative burden. These paradoxes indicate more profound contradictions between different visions of the future of logistics. Some entrepreneurs see ESG as part of the business model; others only try to obey the law and regulations (Wang et al., 2021).

Previous research on ESG in logistics in Poland has focused mainly on identifying implementation barriers, analysing compliance with standards, assessing risks, and conducting descriptive analyses of ESG implementation cases (Witkowski, Pisarek, 2017; Zhou et al., 2023). Less attention has been paid to what ESG development scenarios are possible and desirable in the long term. Analysing what value models and financial strategies can promote or impede environmental investments is also important.

In addition, there are few future studies on integrating ESG with strategic foresight and design methods. These can dig up risks, limitations, utopian futures, and systemic paths.

Therefore, this article aims to (1) anticipate possible ESG transformation trajectories in the Polish logistics sector using the Design Futures approach and speculative scenario writing tools, (2) identify key systemic enablers and barriers to ESG implementation, and (3) explore the methodological value of futures thinking in sustainability planning.

The study used desk research (analysis of strategic documents, industry and ESG reports), trend analysis and methods for designing narrative future scenarios. The paper presents three contrasting scenarios of ESG in logistics: (1) deep sustainable transformation, (2) ESG as superficial regulatory compliance, and (3) stagnation resulting from systemic crises.

The paper is an original contribution to sustainable finance, logistics, and strategic foresight literature. It proposes an interdisciplinary approach that combines economics, management, design, and future science. It also points to practical implications for logistics companies. In the face of growing environmental tensions, regulatory pressure, and social expectations, thinking about the future of ESG in logistics is becoming useful and necessary.

This article is the first to apply Design Futures and speculative scenario methods to explore ESG transitions in the Polish logistics sector, offering an original interdisciplinary approach that integrates foresight, sustainability strategy, and economic transformation. The research aims to (1) anticipate possible ESG transformation trajectories by 2040, (2) identify key systemic drivers and barriers to ESG implementation, and (3) assess the methodological contribution of design- and futures-based approaches to long-term sustainability planning.

The paper is structured as follows: Section 2 offers a Literature Review of futures thinking and ESG. Section 3 outlines the methods, conceptual foundations, and the research process for scenario creation—section 4 details the Results, outlining three possible ESG scenarios. Section 5 offers a Discussion of findings against systemic circumstances and strategic considerations. Finally, Section 6 offers the Conclusions, including policy, practice, and recommendations for future research.

2. Literature review

The ESG concept is a tool for assessing the activities of companies in the context of their environmental, social and governance responsibility. Considering ESG in investment analysis can lead to better long-term financial and social performance (UN Global Compact, 2004).

According to OECD (2020), ESG refers to "standards for disclosing non-financial information by companies that reflect their impact on the environment, society and the way the organization is managed and assess the risks and opportunities associated with the long-term value of the company". Similarly, Schoenmaker and Schramade (2018) define ESG as "a set of non-financial factors that affect the value of a company by influencing its regulatory, reputational and investment environment".

In turn, Eccles and Krzus (2018) indicate that ESG is not only a set of metrics but also a way of thinking strategically. The long-term success of an organization depends on its relationships with key stakeholders and responsible management.

In practice, ESG elements include, among others (MSCI, 2023):

- environmental: greenhouse gas emissions, energy efficiency, waste management,
- social: working conditions, diversity and inclusion, human rights, relations with local communities,
- governance: management structure, transparency of operations, business ethics, anti-corruption.

The implementation of ESG principles is increasingly becoming an institutional requirement (e.g. EU taxonomy, CSRD directive) and an expression of a new norm of corporate responsibility. In the context of the logistics sector, ESG can contribute to increased operational efficiency, improved reputation, access to financing and reduction of regulatory and environmental risks (Lazar et al., 2021; Kolasińska-Morawska, Ziółko, 2023).

Traditional approaches to economic research are based on exploring historical data, econometric models and predictions based on the past. In complex environmental, social and technological crises, transformational and foresight approaches are gaining increasing importance, allowing us to imagine alternative futures and analyze their consequences (Slaughter, Hines, 2020; Raworth, 2017).

In the foresight literature, two main approaches are distinguished: strategic foresight, a benevolent identification of potential trajectories of system development (Young, 2008), and narrative scenario writing, which creates qualitative stories about the future based on data from various actors and values (van der Heijden, 2004).

Design Futures is a research and practice approach that combines design with foresight and systemic analysis. Its goal is not to predict the future but to create it through speculation, imagination and constructive doubt (Candy, Dunagan, 2017). The opposite of extrapolative forecasts is speculative design, which allows for the design of alternative worlds, future artefacts and scenarios that force the viewer to reflect on the present (Dunne, Raby, 2013).

In the context of ESG in logistics, Design Futures allows for the exploration of questions such as:

- What if ESG became a prerequisite for economic activity?
- What could ESG financing and reporting models look like in 2040?
- What values and narratives would support sustainable logistics of the future?

Although design approaches are used even less frequently in economics, they are gradually being recognized as a flattening of classical analyses, especially in research on social innovation, sustainable development and sectoral transformations (Manzini, 2015; Facer, 2016).

This study integrates three perspectives:

- The ESG concept as a strategic paradigm of sustainable management.
- The foresight perspective as a tool for exploring alternative development paths.
- Moreover, designing the future is a method for designing valuable visions.

On this basis, a set of ESG scenarios in the Polish logistics sector was constructed, considering institutional, economic and cultural variables.

3. Methods

This research uses a qualitative, exploratory, and forward-looking research methodology. We based on strategic foresight and Design Futures. The study explores possible long-term trajectories of ESG development in the Polish logistics sector. We want to construct alternative futures that outline how ESG might develop under different institutional, financial, cultural, and regulatory forces. The research is grounded on three theoretical foundations:

- the ESG model as a paradigm of sustainable business management,
- foresight as a method of anticipating changes in the system,
- speculative design as a tool for constructing conjectural, value-charged futures.

The research began with desk research, including analyzing secondary data, sector reports, ESG disclosures of logistics firms, EU regulatory documents and relevant academic literature. This phase aimed to identify current ESG trends, constraints, and enabling factors in the logistics sector in Poland.

Based on this review, the author identified a set of key variables influencing ESG transitions, such as the availability of sustainable finance, regulatory pressure, organizational culture, technological innovation, and stakeholder expectations.

The next stage involved the development of three contrasting narrative scenarios for ESG in logistics by the year 2040. The scenario construction method follows foresight literature (van der Heijden, 2004; Facer, 2016), emphasizing narrative plausibility over statistical probability.

Each scenario presents a different trajectory of ESG transition: a deep and systemic transformation, a stagnated or superficial adaptation, and a regressive or blocked pathway. The scenarios include governance models, ESG reporting frameworks, investment strategies, and public policy context.

Moreover, imagined experiences of actors within the logistics ecosystem. The narratives are not intended as forecasts but as thought experiments, enabling critical reflection on the present and exploration of what kinds of futures are desirable or avoidable.

In order to enrich the imaginative component of the study, the speculative design approach was adopted. This involved the creation of an artefact of the future: a hypothetical piece of an ESG report of a logistics company in Poland in 2040. The artefact is a complex object, representing one of the possible materializations of ESG logic in future corporate existence.

The use of speculative design is aligned with the goal of Design Futures: to provoke debate, widen the range of possibilities under consideration, and examine deep cultural, institutional, and value-based assumptions about the future.

4. Research results

Table 1 presents a comparative overview of three narrative scenarios of ESG evolution in the Polish logistics industry until 2040. Each scenario foresees a different path of ESG evolution based on different institutional, economic, and organizational drivers.

Scenario 1: Compliance is a low-ambition pathway in which ESG practices are implemented primarily due to external regulatory pressure. Integration is shallow and reactive, and there are SME difficulties in meeting formal requirements. The social and environmental impact of ESG activities under this scenario is modest.

Scenario 2: Transformation illustrates a deep and strategic integration of ESG principles into logistics operations. ESG becomes a guiding vision for long-term value creation and system change. SMEs are actively supported through policy and financing tools. This scenario achieves the most favourable outcomes in both social and environmental dimensions.

Scenario 3: Innovation depicts ESG as a means of experimentation and competitive advantage. Under this scenario, ESG catalyses innovation in logistics services, technology, and business models. It is a dynamic and opportunity-led strategy with a patchy impact: profound in some sectors but scattered in general. SMEs become niche innovators or face marginalization.

Table 1.
Comparison of ESG Scenarios in Polish Logistics (2040)

Dimension	Scenario 1: Compliance	Scenario 2: Transformation	Scenario 3: Innovation
ESG Motivation	Regulatory pressure	Strategic vision	Competitive advantage
Integration level	Superficial, reactive	Deep, cross-functional	Selective, agile
Investment logic	Minimum required	Long-term value creation	Opportunity-driven
Role of SMEs	Struggling with compliance	Fully supported by policy & finance	Niche innovators or excluded
Social impact	Low	High	Mixed (opportunities + risks)
Environmental outcome	Marginal	Substantial	Differentiated, tech-focused

Source: own elaboration based on Eurostat database.

Figure 1 presents a relative schematic visualization of ESG development pathways in the Polish logistics market until 2040. Relative ambition in each scenario and the relative coherence along six strategic dimensions are emphasized.

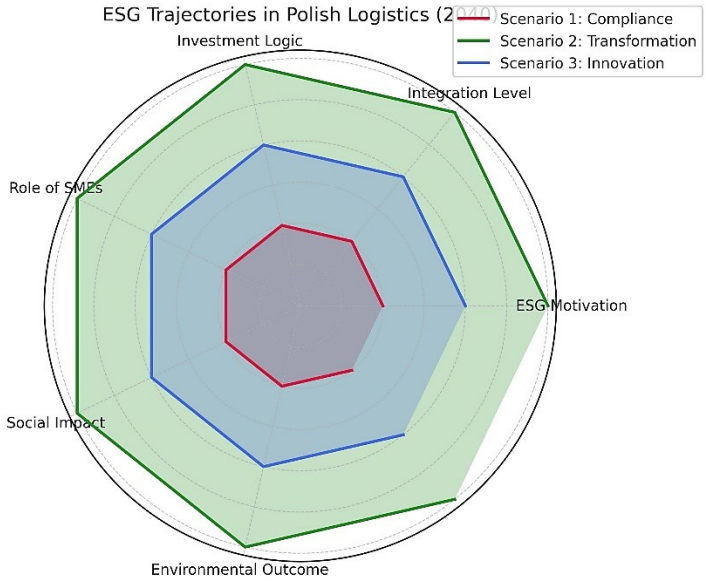

Figure 1. ESG Trajectories in Polish Logistics (2040).

Source: own elaboration.

The rounded and expansive shape of the Transformation scenario indicates a holistic, balanced and systemic approach, with consistent high engagement in ESG integration, investment logic, and social and environmental impact. In contrast, the compact and constrained shape of the Compliance scenario suggests minimal engagement, fragmented effort, and low transformative capacity. The innovation scenario appears asymmetric, pointing to selective prioritization — strong in competitiveness and experimentation but less comprehensive in social and SME inclusiveness.

This visual format enables a quick grasp of how different ESG logics manifest in strategy, revealing not just content but pattern and distribution of focus — essential in understanding future policy and managerial choices.

Table 2 presents the key enablers and barriers to implementing ESG in the Polish logistics sector. It is divided into four categories: regulatory, financial, cultural and technological. Each presents both positive impulses for change and constraints encountered in practice.

Table 2.
Key Drivers and Barriers of ESG Implementation in Polish Logistics

Category	Key Drivers	Key Barriers
Regulatory	EU Taxonomy, CSRD, Fit for 55 policies	Complexity of ESG reporting and legal compliance
Financial	Access to green bonds and ESG investment funds	Limited financial capacity and access for SMEs
Cultural	Growing awareness of sustainability in society	ESG fatigue and resistance to change in management culture
Technological	Adoption of AI and IoT in logistics monitoring	High cost and uncertainty of adopting green innovations

Source: own elaboration based on Eurostat database.

The regulatory landscape at the EU level (e.g., CSRD, Fit for 55) is a primary driver of ESG expectations but also creates complexity in compliance. Financially, the emergence of green investment products contrasts with most SMEs' limited capacity to access such funds. Culturally, organizational inertia and ESG fatigue generally oppose growing sustainability awareness. Technologically, new instruments such as IoT and AI enable ESG monitoring but require investment and risk tolerance.

This matrix highlights the systemic interplay of forces that can accelerate or decelerate ESG transformation and serves as a foundation for interpreting plausibility and challenges in the scenarios developed.

Table 3 presents the key actions that need to be taken to achieve the most ambitious scenario – Transformation – in a four-step timeline (2025, 2030, 2035, 2040). These actions include:

- 2025: Political and financial foundations (e.g. ESG roadmap, green public procurement, ESG credits),
- 2030: ESG integration with sector metrics and mandatory training for managers,
- 2035: ESG mainstreaming in SMEs, AI monitoring, ESG innovation clusters,
- 2040: Universal climate neutrality, ESG as a reputational and market asset.

The table serves as a backcasting plan to define what needs to happen today and in the coming years to reach the desired state in 2040.

Table 3.
Backcasting Pathway to ESG Transformation in Polish Logistics by 2040

Time Horizon	Strategic Milestones / Interventions
By 2025	– National ESG roadmap for the logistics sector introduced. – Green public procurement pilot in transport and warehousing. – Establishment of ESG competency centers for SMEs. – Preferential financing mechanisms launched (green credits, ESG bonds).
By 2030	– Mandatory ESG training for logistics managers and board members. – Integration of ESG metrics into national logistics performance indicators. – Tax reliefs for investments in low-emission fleets and circular logistics. – Transparent ESG ratings become standard for B2B contracts.
By 2035	– 60% of logistics SMEs with ESG-aligned business strategies. – Real-time ESG monitoring via AI and blockchain adopted in large firms. – Cross-sectoral ESG innovation clusters (e.g., transport–energy–ICT).
By 2040	– Majority of logistics operators operate carbon-neutral or net-zero supply chains. – ESG becomes a reputational asset and market differentiator. – ESG-linked wages and bonuses introduced across the sector.

Source: own elaboration based on Eurostat database.

Table 4 shows Appendix A, which is an official and forward-looking ESG performance snapshot of LogiTrans Polska S.A. within the "Transformation" scenario by 2040. The table categorizes the company's achievement on the three ESG pillars—Environmental, Social, and Governance—and cross-cutting and forward-looking. It presents a synthetic yet integrated picture of how ESG values can be infused into business strategy, operations, and stakeholder engagement within the Polish logistics sector.

The ESG performance indicators presented in the LogiTrans S.A. artefact were selected based on their relevance to EU regulatory frameworks (e.g., CSRD, EU Taxonomy), commonly used ESG rating methodologies (e.g., MSCI, GRI), and strategic importance for the logistics sector. Criteria included regulatory alignment, operational relevance, and the ability to capture measurable, long-term impact across environmental, social, and governance dimensions.

Table 4.
ESG Report Snapshot – LogiTrans Polska S.A. (2040)

ESG Dimension	Category	Key Achievements / Initiatives
Environmental	CO_2 Emissions	73% reduction since 2020
	Fleet Transition	100% zero-emission fleet
	Circular Logistics	System implemented in 8 regional hubs
Governance	Organizational Structure	ESG Committee evolved into Strategic Governance Board
	Financial Integration	ESG-linked executive compensation model (since 2032)
	Contractual Standards	92% of contracts aligned with National ESG Standard
Social	Leadership	Gender-balanced management board
	Workplace Culture	Mental health support and inclusive workplace certification
	Employee Engagement	17% increase in retention since 2030
Cross-Cutting	Training	2,500 employees trained via Green Leadership Academy
	Partnerships	Active role in EU Climate-Smart Transport Coalition
Outlook	Future Vision	Roadmap to ESG 3.0 and autonomous clean delivery systems by 2045

Source: own elaboration based on Eurostat database.

In an environmental review, LogiTrans has reduced its carbon footprint by 73% since 2020, introduced a fleet of zero-emission vehicles and installed circular logistics systems in eight regional hubs. These efforts have proven a strong commitment to climate neutrality and resource efficiency.

Governance: The company has advanced its ESG Committee to a Strategic Governance Board, integrating ESG monitoring into the core of strategic planning. The fact that there is ESG-related executive remuneration and high contractual ESG alignment (92%) speaks volumes of the strong governance culture in which sustainability performance drives decision-making and interactions with the external environment.

The social is also massively impacted. LogiTrans confirms a balanced-gendered board of directors, a certified workplace for inclusion, and employee retention 17% higher than in 2030. These achievements confirm that the company is focused on staff wellbeing, inclusivity, and long-term interest.

Cross-cutting initiatives include upskilling 2,500 employees via the Green Leadership Academy and actively participating in the EU Climate-Smart Transport Coalition to indicate sector leadership and alignment with international sustainability goals. The final section explains the company's strategic vision, which includes scaling autonomous clean delivery systems and adopting ESG 3.0 frameworks by 2045.

Table 4 illustrates how aspirational ESG goals can be deconstructed into concrete and measurable metrics, giving a roadmap for logistics transformation at a system level. It illustrates that genuine ESG integration is not compliance—it reimagines governance, investment values, and operating ethos.

Notably, ESG has moved from a risk management strategy to a strategic resource and competitive advantage driver, influencing everything from procurement contracts to leadership incentives. The change scenario also supports the idea that organizational culture and human capital are at the core of ESG success. Investments in employee engagement, diversity, and training directly impact performance and resilience.

Finally, the way forward for the company is the future of ESG 3.0, a next-generation sustainability framework that integrates digitalization, automation, and systems thinking. Under this vision for the future, ESG is placed alongside environmental or regulatory requirements. In this vision for the future, ESG is aligned with environmental or regulatory requirements and innovation, value creation, and social purpose.

Figure 2 offers a full-colour visualization integration of the study findings, merging four core analytical components: scenario analysis, systemic drivers and impediments, a backcasting transformation timeline, and a future-oriented company case (LogiTrans S.A.).

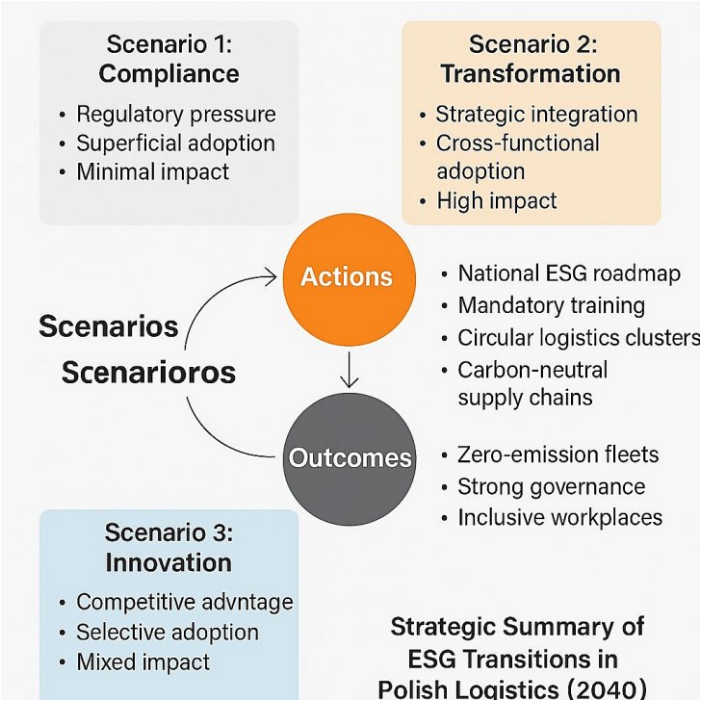

Figure 2. Strategic Summary of ESG Transitions in Polish Logistics (2040).

Source: own elaboration based on scenario methodology and speculative foresight.

Three narrative scenarios—Compliance, Transformation, and Innovation—are at the image centre and symbolize varied ESG transition paths for the Polish logistics sector by 2040. All the scenarios are supported by alternative institutional, strategic, and cultural logic, from regulatory compliance minimalism to systemic ESG embedding and innovation-led evolution.

Around the scenario framework, the infographic highlights the key enablers and barriers that influence ESG implementation. These are grouped into four essential dimensions: regulatory, financial, cultural, and technological. This model captures the results of Table 2 and highlights that ESG development is not a one-size-fits-all solution—it depends on the dynamic interplay between internal capabilities and external pressures. The trajectory a firm or industry follows is shaped by how these forces intersect, facilitate, or constrain change.

The infographic also adds a backcasting roadmap (2025-2040), with such significant milestones as national ESG roadmaps, compulsory training, financing mechanisms, innovation clusters, and net-zero supply chains. These align with Table 3 and show how deliberate, sequenced actions can create the conditions for the Transformation scenario.

The bottom represents a hypothetical snapshot of LogiTrans Polska S.A.'s ESG in 2040, drawing from Table 4. What the future should hold is displayed in this illustration, with such success in curbing carbon emissions, governance reform, employee activism, and planning (e.g., ESG 3.0 and self-driving transportation systems).

ESG change should be strategic, multidimensional, and co-created by institutions, firms, technologies, and cultures. It explains how foresight techniques can support ESG deployment by offering systemic, realistic, and actionable futures. It also reiterates the most important finding of the study: that integrated well, ESG is not a bottleneck but an instrument of innovation, competitiveness, and public value.

5. Discussion

Our research aimed to explore how ESG practices might evolve in the Polish logistics sector by 2040 and what factors influence the natural transformation. We developed three future pathways and assessed the systemic forces that may enable or constrain them.

The first research question concerned the plausible development pathways of ESG in the Polish logistics sector. The three constructed scenarios offer distinct visions of the future: the Compliance scenario represents minimal regulatory-driven engagement; Innovation reflects agile, opportunity-led experimentation; and Transformation depicts full strategic integration of ESG into logistics operations. Only the Transformation scenario aligns comprehensively with long-term sustainability goals, suggesting that significant institutional, financial, and cultural adaptation is required to achieve such an outcome.

The second question focused on the key systemic drivers and barriers to ESG implementation. As shown in Table 2, regulatory mandates (e.g., CSRD, EU Taxonomy), green financing, and digital infrastructure can catalyze change. However, ESG fatigue, cultural resistance, and limited SME capacity remain critical obstacles. The interplay between these

enablers and constraints confirms that ESG transitions are path-dependent and require coherent cross-sectoral coordination.

The third research question was about the value of design-based and speculative methods in ESG planning. The research shows that narrative futures and speculative artefacts are valuable tools in uncertain and complex situations. They allow organizations and policymakers to conceptualize long-term trajectories, test dominant assumptions, and evaluate various development logic in a structured way.

The most desirable transformation scenario delivers broad environmental and social benefits. It supports views from sustainability scholarship (Schoenmaker, Schramade, 2018) that ESG can become a source of innovation, strategic alignment, and stakeholder value when fully embedded into business models. Its operationalization—outlined through the backcasting timeline (Table 3)—depends on institutional support, financial incentives, and managerial capacity building.

The compliance scenario reinforces the criticism that ESG, when driven solely by regulation, risks becoming a superficial or symbolic exercise (Forliano et al., 2025). Due to complex reporting requirements and limited access to ESG financing, SMEs are particularly vulnerable in this pathway. Without supportive structures, ESG compliance may not lead to real sustainability outcomes.

The innovation scenario offers an agile, entrepreneurial path that treats ESG as a source of experimentation and advantage. While this logic aligns with emerging ESG-business case models (Porter, Kramer, 2011), it also reveals disparities. Without coordinated public policy, firms with lower innovation capacity or ESG maturity may fall behind—widening inequalities in the sector.

The barrier-driver matrix confirms that ESG adoption is not a purely rational or linear process. Cultural readiness—leadership mindsets, openness to change, and organizational learning—is as important as technical tools or regulatory pressures. ESG transitions require a shift in how logistics firms define value, risk, and responsibility. This aligns with recent research highlighting sustainability transformation's social and cognitive dimensions (Fougère, Solitander, 2020).

The ESG snapshot of LogiTrans Polska S.A. (Table 4) demonstrates how aspirational ESG objectives can be operationalized into measurable actions. The artefact incorporates circular logistics, inclusive governance, ESG-linked compensation, and training programs—offering a vision of ESG maturity. Although speculative, this scenario helps firms and policymakers imagine the institutional architecture needed to support fundamental Transformation.

This study is qualitative, exploratory, and speculative. It does not claim generalizability but aims to provoke structured reflection on plausible futures. Using secondary data and narrative construction means the results require further empirical validation—such as interviews with logistics firms, surveys, or foresight workshops. A second important limitation is the absence

of direct stakeholder perspectives. While the scenario building was grounded in robust secondary data and regulatory documents, incorporating SMES', policymakers', and logistics practitioners' perspectives would bring contextual richness and experiential knowledge to the analysis. Future research needs to include participatory foresight workshops or Delphi panels to complement the desk research. Future research should consider participatory foresight workshops or Delphi panels to complement the desk research.

Furthermore, the situations in this paper can be extended by adding geopolitical and macroeconomic shocks such as energy crises, inflationary shocks, or global supply chain realignments. Such externalities can reshape ESG agendas, accelerate changes, or slow developments, particularly in poor logistics subsectors. Stress-testing situations against such shocks would make them more resilient and policy-relevant.

Theoretically, this research contributes to bridging future studies with ESG scholarship, proposing a new lens for analyzing complex, long-term sustainability transitions. It challenges linear planning models and invites interdisciplinary dialogue between design, strategy, and economics.

The results offer scenario-based materials to companies, regulators, and investors. The results can inform long-term ESG master plans, training plans, funding mechanisms, and stakeholder engagement processes. Importantly, differentiated ESG support policies are needed to reflect firm size and capacity. Large logistics players require regulatory certainty, investment incentives, and innovation hubs. SMES, on the other hand, face challenges such as limited capital, lack of ESG competencies, and compliance expenses. Public support must incorporate simple reporting facilities, subsidised training, digital ESG platforms, and green financing programs available at an affordable cost for small businesses. Organisations can increase their adaptive capacity and resilience in preparation for the possible future development of ESG and act accordingly.

These findings serve as a basis for ESG strategic planning and capacity-building programmes, especially in sectors undergoing regulatory and technological transition.

6. Conclusions

This paper explored possible ESG transition pathways in the Polish logistics sector by 2040 using Design Futures and scenario methods. The three scenarios—Compliance, Transformation, and Innovation—reflect different levels of ambition and system change. Only the Transformation scenario leads to deep integration of ESG into business strategy and operations, with the most sustainable and inclusive outcomes.

The research illustrates that ESG development depends on the interaction of regulatory, financial, cultural, and technological drivers. Without institutional support, ESG has the potential to be shallow or unevenly applied, particularly in SMEs.

The backcasting roadmap and LogiTrans S.A. snapshot illustrate how ESG transformation can be achieved through strategic direction, policy support, and investment in people and innovation. Future thinking adds value by allowing organizations and policymakers to anticipate challenges and prepare long-term solutions.

Logistics businesses must treat ESG as a strategic opportunity, not a compliance exercise. Policymakers must provide decisive ESG policy guidance, financial incentives, and capacity-building support, especially for SMEs.

The study contributes to future ESG literature by illustrating how scenario methods can inform strategic sustainability planning. Future research is invited to test the scenarios empirically and examine their relevance to other industries and countries. By combining foresight, ESG analysis, and design thinking, this paper contributes to a deeper understanding of systemic sustainability transitions.

References

1. Candy, S., Dunagan, J. (2017). Designing an experiential scenario: The people who vanished. *Futures*, *86*, 136-153. https://doi.org/10.1016/j.futures.2016.05.006.
2. Chopra, S.S., Senadheera, S.S., Dissanayake, P.D., Withana, P.A., Chib, R., Rhee, J.H., Ok, Y.S. (2024). Navigating the Challenges of Environmental, Social, and Governance (ESG) Reporting: The Path to Broader Sustainable Development. *Sustainability*, *16*(2), 606. https://doi.org/10.3390/su16020606.
3. Dunne, A., Raby, F. (2013). *Speculative Everything: Design, Fiction, and Social Dreaming*. Cambridge, MA: MIT Press.
4. Eccles, R.G., Krzus, M.P. (2018). The Nordic model: An analysis of leading practices in ESG disclosure. *Journal of Applied Corporate Finance*, *30(2),* 54-68. https://doi.org/10.1111/jacf.12236.
5. Facer, K. (2016). Using the Future in Education: Creating Space for Openness, Hope and Novelty. In: H. Lees, N. Noddings (eds.), *The Palgrave International Handbook of Alternative Education.* London: Palgrave Macmillan. https://doi.org/10.1057/978-1-137-41291-1_5
6. Forliano, C., Battisti, E., de Bernardi, P. et al. (2025). Mapping the greenwashing research landscape: a theoretical and field analysis. *Rev. Manag. Sci.* https://doi.org/10.1007/s11846-025-00856-3

7. Fougère, M., Solitander, N. (2020). Dissent in Consensusland: An Agonistic Problematization of Multi-stakeholder Governance. *J. Bus. Ethicsm., 164*, 683-699. https://doi.org/10.1007/s10551-019-04398-z.
8. Friedman, H.L., Heinle, M.S., Luneva, I. (2021). *A Theoretical Framework for ESG Reporting to Investors Available at SSRN.* https://ssrn.com/abstract=3932689; http://dx.doi.org/10.2139/ssrn.3932689
9. Kimbrough, M.D., Wang, X. (Frank), Wei, S., Zhang, J. (Iris). (2022). Does Voluntary ESG Reporting Resolve Disagreement among ESG Rating Agencies? *European Accounting Review*, *33*(1), 15-47. https://doi.org/10.1080/09638180.2022.2088588.
10. Kolasińska-Morawska, K., Ziółko M. (eds.) (2023). *Zrównoważona logistyka*. CeDeWu.
11. Lazar, S., Klimecka-Tatar, D., Obrecht, M. (2021). Sustainability orientation and focus in logistics and supply chains. *Sustainability*, *13(6),* 2021, 3280.
12. Manzini, E. (2015). *Design, When Everybody Designs: An Introduction to Design for Social Innovation*. Cambridge, MA: MIT Press.
13. MSCI (2023). *ESG Ratings Methodology*. Retrieved from: https://www.msci.com/our-solutions/esg-investing/esg-ratings, April 2024.
14. OECD (2020). *Business Responsibility and the Sustainable Development Goals*. OECD Publishing. https://www.oecd.org/corporate/Business-Responsibility-and-SDGs.pdf
15. Porter, M.E., Kramer, M.R. (2011). Creating Shared Value. *Harvard Business Review, 89*, *no. 1-2 (January-February).*
16. Raworth, K. (2017). Doughnut Economics: Seven Ways to Think Like a 21st Century Economist. *Regional and Business Studies, 11(2).* https://doi.org/10.33568/rbs.2409.
17. Schoenmaker, D., Schramade, W. (2018). *Principles of Sustainable Finance*. Oxford University Press.
18. Slaughter, R.A., Hines, A. (2020). The knowledge base of futures studies 2020. *Foresight International*.
19. UN Global Compact (2004). *Who Cares Wins: Connecting Financial Markets to a Changing World*. United Nations. https://www.unglobalcompact.org/library/1452
20. van der Heijden, K. (2004). *Scenarios: The Art of Strategic Conversation* (2nd ed.). Hoboken, NJ: Wiley.
21. Wang, C., Zhang, C., Hu, F. et al. (2021). Emergy-based ecological efficiency evaluation and optimization method for logistics park. *Environ. Sci. Pollut. Res*., *28*, 58342-58354. https://doi.org/10.1007/s11356-021-14781-x
22. Witkowski, J., Pisarek, A. (2017). Istota zielonych łańcuchów dostaw – Propozycja systematyzacji pojęć. *Zeszyty Naukowe Uniwersytetu Ekonomicznego w Katowicach, 315,* 11-26.

23. Young, R.A. (2008). An integrated model of designing to aid understanding of the complexity paradigm in design practice. *Futures, 40, 6,* https://doi.org/10.1016/j.futures.2007.11.005
24. Zhou, B., Siddik, A. B., Zheng, G.-W., Masukujjaman, M. (2023). Unveiling the Role of Green Logistics Management in Improving SMEs' Sustainability Performance: Do Circular Economy Practices and Supply Chain Traceability Matter? *Systems*, *11*(4), 198. https://doi.org/10.3390/systems11040198.