

ESG AND GREEN INNOVATION IN THE HOUSEHOLD CHEMICALS INDUSTRY: A CASE STUDY OF THE ALTAÏR GROUPE

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Purpose: The main objective of the research conducted for the purposes of this article was to identify the impact of the implementation of the ESG concept on the process of developing green innovations in a company from the household chemicals industry - the ALTAÏR Groupe

Design/methodology/approach: The study was exploratory and interpretive in nature. A qualitative case study approach was employed, supported by appropriate research methods: in-depth interviews, thematic analysis, and analysis of internal documents.

Findings: ESG serves as a strategic mechanism for managing corporate development at the ALTAÏR Groupe and is strongly linked to innovation processes. Green innovation is perceived as a response to the existing regulatory framework and stakeholder pressure. Key factors contributing to the development of green innovation include strong strategic leadership, interdepartmental collaboration, well-developed research and development competencies, organizational culture, organizational flexibility, and crisis situations. Barriers to innovation include resistance to change, high innovation costs, the ever-increasing number of regulations and their short implementation deadlines, and the imperative to reconcile high product effectiveness with the natural origin of ingredients.

Research limitations/implications: Due to the qualitative nature of the research conducted through a single case study, there is no basis for generalizing the conclusions to the entire industry. Therefore, further research is worthwhile, allowing both to deepen theoretical knowledge and to verify the obtained empirical results. In particular, an interesting avenue of scientific exploration seems to be the assessment of the impact of each ESG dimension (environmental, social, governance) on green innovation, conducted in a quantitative study covering a large group of companies in the household chemicals industry.

Practical implications: The article provides recommendations for managers and decision-makers in the studied industry.

Originality/value: This article expands knowledge on the implementation of green innovations in the household chemicals industry and identifies the mechanisms through which ESG principles support innovation.

Keywords: green innovation, household chemicals industry, ESG, thematic analysis, case study.

Category of the paper: Research paper, case study.

1. Introduction

Previous research does not provide a clear answer to the question of the relationship between the implementation of ESG (Environmental, Social, Governance) principles in a company and innovation. Some researchers argue that ESG practices have a positive impact on the development of innovation. They note that systematically assessing a company's ESG not only supports regulatory compliance and risk management but also acts as a catalyst for strategic, sustainable innovation (Dicuonzo et al., 2022; Zhou et al., 2023; Chen et al., 2023; Cabaleiro-Cerviño, Mendi, 2024; Tang, 2022; De Medeiros et al., 2022; Sanclaudio et al., 2025; Sun, Zhang, 2025; Li et al., 2023; Broadstock et al., 2020; Bothongo, Kinyar, 2025). ESG ratings facilitate the transition from symbolic to substantive green innovations (Zhang et al., 2024). This is crucial because pressure from environmental regulations often forces companies to passively implement symbolic green innovations, defined as "short-lived, adaptable, and rapid innovations". Fuente et al. (2022) found that ESG ratings allow investors to better understand managers' agency behavior, which helps reduce investor oversight costs and encourages companies to develop green technology innovations. There are also studies that are skeptical of ESG ratings in the context of green innovation. They conclude that implementing and disclosing ESG aspects can require significant capital investments and encourage greenwashing and public opinion manipulation (Liu et al., 2022; de Silva Lokuwaduge et al., 2022; Yoo et al., 2024).

The research findings cited above provide valuable insights into the relationship between ESG and green innovation, but they do not directly address the household chemicals industry. This industry not only plays a significant role in the global economy but is also undergoing significant changes in response to the Sustainable Development Goals (SDGs). Household chemicals companies remain under intense pressure from environmental regulations and the demand for organic and natural products. They face growing price competition and the growing importance of e-commerce, which necessitates the development of online sales while maintaining traditional sales channels (hypermarkets, supermarkets).

The overall goal of the research was to identify the impact of implementing the ESG concept on the development of green innovations at a household chemicals company, the ALTAÏR Groupe. The specific objectives are:

- O1: Determining the role of ESG in the ALTAÏR Groupe management system.
- O2: Exploring the impact of the environment (micro- and macro-) on the Group's ESG activities.
- O3: Identifying the approach to innovation management at the ALTAÏR Groupe.
- O4: Identifying factors supporting and barriers to the Group's innovation activities.

Four research questions were formulated to address the above objectives:

Q1: What role does ESG play in the ALTAÏR Groupe management system?

Q2: What is the impact of the environment (micro- and macro-) on the Group's ESG activities?

Q3: What is the innovation management process at the ALTAÏR Groupe?

Q4: What factors support and which constitute barriers to the Group's innovation activities?

The first part of the study presents a description of the household chemicals industry. The second part defines green innovations and presents the rationale for their development in the household chemicals industry. The following sections describe the research methodology, results and conclusions, and recommendations for improvement actions for the ALTAÏR Groupe.

2. General Description of the Household Chemicals Industry – Trends and Challenges

The household chemicals industry is an industrial sector engaged in the production and distribution of cleaning products, detergents, and hygiene products used in households, as well as in public facilities and restaurants. The main product categories include: laundry detergents (powders, capsules, liquids, and gels), cleaning products (dishwashing liquids, glass and floor cleaners, milk cleansers, and toilet cleaners), and home hygiene and care products (air fresheners, dishwasher tablets, and drain unblockers).

A report prepared by the Office of International Strategy and Analysis at PKO BP (2020) shows that in 2019:

- The United States was the largest market in the industry globally, with revenues of €22.3 billion, representing 16.3% of global sales.
- The highest revenues from sales of cleaning and laundry products, at €52.2 billion, were generated in Asia.
- Germany is the world leader in household chemicals exports, with a market share of 14.2%.
- Switzerland holds the top spot globally and in Europe in terms of per capita spending on laundry and cleaning products. Their average spending in 2019 was €76.50.

Data published on the Chemia i Biznes website (<https://www.chemiaibiznes.com.pl>) indicates that in 2024, the total value of the laundry, home cleaning, and professional hygiene products market in the region encompassing the EU-27, the United Kingdom, Switzerland, and Norway was €47.6 billion. The consumer segment (household care) accounted for €37.8 billion, while products and solutions for the professional sector (professional cleaning & hygiene) generated €9.8 billion. The largest product group was fabric care products (laundry

care), with a value exceeding €18 billion. The analyzed industry created 95,000 jobs in production plants and 360,000 jobs across the entire value chain. Household chemicals production was local and decentralized. There were approximately 700 production plants in Europe, 85% of which were small and medium-sized enterprises.

The industry is influenced by a complex set of external factors. In addition to macroeconomic indicators, which determine the overall health of the economy, regulatory frameworks, consumer preferences, and technological progress play a significant role. Governments around the world are tightening regulations on toxic substances, plastic packaging, chemical labeling, carbon dioxide emissions, and wastewater discharge. Consumers expect products that are effective yet safe for health and the environment. The industry is witnessing technological advances focused on sustainability, particularly the development of safe and environmentally friendly chemicals. Under these circumstances, the pursuit of sustainable development has become not only a moral obligation for companies in the analyzed industry but also the foundation for building a competitive advantage and strengthening their market position.

3. The Concept and Importance of Green Innovation and the Rationale for Its Creation in the Household Chemicals Industry

Green innovations address environmental challenges such as climate change, resource depletion, and environmental pollution (Marco-Lajara et al., 2023; Thomas et al., 2022; Martínez-Falcó et al., 2024; Kumar et al., 2025). Because they help reduce negative environmental impacts by optimizing resource use, minimizing waste, and conserving natural resources (Kumar et al., 2025; Desalegn, Tangl, 2022), they are crucial for the sustainable development of enterprises. It should be noted that the positive impact of green innovation on corporate sustainability is largely moderated by corporate governance practices (Bagh et al., 2024). Furthermore, agency problems cause state-owned enterprises to perform worse in terms of green innovation than private enterprises (Quan et al., 2025).

Green innovations may include: the development of environmentally friendly products (Thomas et al., 2022; Khan et al., 2023), the implementation of sustainable production methods (Thomas et al., 2022; Fei et al., 2016), the implementation of business strategies that integrate sustainability (Fei et al., 2016; Latif et al., 2025), as well as organizational changes supporting sustainable development (Fei et al., 2016). What distinguishes them is a long investment cycle, a high risk of failure and low rates of return (Zhang et al., 2024).

In the household chemicals industry, green innovations are based on the 12 principles of "green chemistry" developed by Paul Anastas and John Warner (1998). These principles include designing chemical products and processes that reduce or eliminate the production of

hazardous substances, using renewable resources, developing biodegradable products, and promoting energy efficiency.

The rationale for green innovation is widely discussed in the literature. Some researchers focus on societal pressure generated by various stakeholders, including governments, consumers, employees (Rayfield, Unsal, 2021), and institutional investors (Cheng et al., 2020). Governments around the world are tightening regulations on toxic substances, plastic packaging, chemical labeling, carbon dioxide emissions, and wastewater discharge. The European Union has been particularly active in legislation. The EU's comprehensive chemicals regulatory framework currently comprises approximately 40 pieces of legislation, including Regulation (EU) No. 1907/2006 on the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH) and Regulation (EC) No. 1272/2009 on the Classification, Labeling, and Packaging of Hazardous Substances (CLP). The REACH regulation aims to control the use of potentially harmful chemicals in household products. This regulation is considered the most stringent in the world, generating significant – often negative – implications for production and distribution practices (Ujaczki, Backmann, 2026; Idahosa-Taylor, Collins, 2019).

In 2021, the Council of the European Union approved the Sustainable Chemicals Strategy (CSS). It aims to protect human health and the environment by minimizing the risks associated with chemicals throughout their life cycle. The CSS emphasizes the gradual phase-out of the most harmful chemicals, the promotion of safer alternatives, and the adoption of a circular economy approach to the production and use of chemicals. The latest regulation is Regulation (EU) 2026/405 of the European Parliament and of the Council on detergents and surfactants, published in March 2026. This document replaces the previous 2004 regulations and represents one of the most significant regulatory updates for the European cleaning products sector in the last two decades. The new regulations aim to enhance consumer protection, improve transparency of ingredient information, adapt regulations to technological advances – including the use of microorganisms in cleaning products – and introduce modern tools such as a digital product passport.

The evolving needs and expectations of consumers are crucial for the development of green innovations. Environmental awareness is increasingly leading consumers to prefer products perceived as non-toxic, sustainable, cruelty-free, and safe for children and pets. This is particularly evident among younger consumers and urban households. Increasingly concerned about the health impact of household chemicals, they often prioritize safety over product efficacy. Environmental awareness and values significantly influence willingness to pay for products with an eco-label (Jaheer Mukthar et al., 2026; Larashati, 2026). Negative factors that influence purchasing decisions include a lack of full knowledge of the chemicals contained in products (Glegg, Richards, 2007; Luchsinger, Bearth, 2026), the high cost, and limited availability of "green" products (Khalil et al., 2022; Glegg, Richards, 2007). It is worth noting that while European consumers focus on health and safety, in other regions of the world, cost

and efficiency remain priorities at the expense of environmental concerns (Luchsinger, Bearth, 2026).

Climate pressures and technological progress also attract the attention of researchers seeking the rationale for green innovations. Natural disasters are changing the perception of climate risk and stimulating pro-environmental actions (Choi et al., 2020; Maio, Popp, 2014; Elnahas et al., 2018; Alok et al., 2020).

The technological progress experienced by the industry is also significant. This is particularly true for the development of safe and environmentally friendly chemicals. The aforementioned EU Strategy for Sustainable Chemicals fundamentally shapes the approach to innovation in this industry, emphasizing that products must be "safe and sustainable by design" (Remonnay, 2025).

4. Methodology

The study adopted a qualitative paradigm, enabling the exploration of organizational processes, corporate culture, and practices related to ESG and innovation. This approach captures the complexity of the company context, industry conditions, and employee subjective experiences. It was exploratory and interpretive in nature, meaning it assumed multiple perspectives and contextualized phenomena. The research approach was an in-depth case study conducted at Groupe Altaïr, an organization in the household chemicals industry. The analysis included the company's ESG management mechanisms, the impact of the environment on ESG activities, the innovation management process, and the factors fostering and barriers to innovation.

The research subject was selected for its active implementation of ESG principles in daily production and R&D processes, its innovative activities, and its willingness to cooperate in a qualitative study. The selection of respondents was purposive, aimed at obtaining the richest possible information from individuals who are involved in ESG activities, participate in innovation processes, hold management positions, and are familiar with the procedures, processes, and mechanisms related to management within the company. A description of the respondents, along with their assigned codes (R1-R8), position, gender, length of service, and location, is provided in Table 1.

Table 1.
Characteristics of respondents

Respondent Code	Position	Gender M – male F – female	Seniority	Location PL – Poland FR – France
R1	CEO/President/Managing Director	M	30	FR
R2	Marketing & Innovation Director/Group Marketing Department	M	9	FR
R3	Chief Commercial Officer/CCO/Group Commercial Director	M	4	FR
R4	Brand and CSR Communication Manager/Group Marketing Department	F	9	FR
R5	Product Data & Codification Manager/Sales & Operations Planning Manager	M	9	FR
R6	Project Manager/Marketing Department	M	8	PL
R7	Regulatory Affairs Manager/R&D Department	F	20	FR
R8	<i>Director of R&D/Regulatory & Compliance Director</i>	F	7	FR

Source: own study based on conducted research.

The following research methods were used: in-depth interviews, thematic content analysis, and analysis of internal documents. The interviews were conducted between February and April 2026 in Poland and France. Eight interviews were conducted, each lasting approximately 60 minutes. The analysis of internal documents utilized ESG and CSR policies, environmental reports, operational procedures, R&D documents, audit and certification reports.

5. Results

5.1. Description of Groupe Altaïr

Groupe Altaïr is a French industrial and commercial entity operating in the household chemicals sector, producing cleaning and household care products. The company was founded in Lille, France, in 1946. It currently operates internationally. The organizational structure is based on a model of distributed business units (Business Units) operating in various countries, including France, Poland, Spain, the Netherlands, and Belgium. This solution allows for the simultaneous maintenance of strategic coherence and the adaptation of operational activities to the specifics and requirements of local markets. Production processes are carried out in specialized industrial plants located in France (two facilities) and Spain (one facility).

The group's core business is the development, production, and distribution of chemical products, including cleaning agents, surface care products, renovation products, and biocides. The scope of operations encompasses production processes (including the production of liquid, aerosol, and specialty products) as well as packaging, logistics, and international supply chain management. A key element of Groupe Altaïr's business is the creation and development of brands across various product categories, with key brands including Starwax, Briochin,

Marcel's Green Soap, and KPro. The company's portfolio encompasses over three thousand products, enabling it to tailor its offerings to diverse consumer groups and specific applications, encompassing both traditional solutions and products with a reduced environmental impact. Additionally, the company develops lines of eco-friendly products certified by Ecocert and EU Ecolabel, confirming their compliance with stringent environmental and consumer safety standards. The Group's products are distributed in 45 countries, with the European market remaining its primary focus. The Groupe employs approximately 490 people and its annual revenues in 2025 reached €190 million (Altaïr Groupe, *ALTAIR Rapport RSE, 2026*, p. 3, company document, 2026).

An important direction of the company's development is the integration of sustainable development principles into its operational and strategic activities. This approach encompasses actions aimed at reducing the negative impact of its operations on the environment, including reducing CO₂ emissions, optimizing the use of raw materials, increasing the share of recycled materials, and eliminating potentially harmful substances (Altaïr Groupe, *Substances Policy*, 2024). At the same time, social and governance aspects related to accountability to stakeholders and transparency are taken into account. The company's sustainable development strategy is based on three fundamental pillars: Planet, Employees, and Consumers. In the Planet area, activities focus on reducing the negative impact of operations on the climate and natural resources, in particular by reducing CO₂ emissions and improving the environmental profile of products. The Employees pillar emphasizes the role of working conditions, developing competencies, and fostering engagement. In the Consumers area, the importance of product safety, quality, and information transparency is emphasized (Groupe Altaïr, *CSR Report*, 2024; Groupe Altaïr Manifesto: Corporate Social Responsibility. Our Commitments to Sustainable Development. Internal Company Document, 2024).

In the Groupe Altaïr management model, ESG does not function as a separate area of activity, but as an integrated element within core organizational processes. In the environmental area, particular importance is attached to reducing the carbon footprint across the entire value chain (scopes 1, 2, and 3), in line with international decarbonization guidelines, including the Science Based Targets initiative (SBTi) approach (Brunel SAS, *CLIM'ACT - réunion du 04/11/25*, internal company document, 2025). In governance, formalized management mechanisms play a significant role, including codes of conduct (Groupe Altaïr, *Code of Conduct for Commercial Relations*, internal company document, 2022), compliance procedures, and internal control systems, including whistleblowing solutions and anti-corruption policies (Groupe Altaïr, *Code of Conduct for Anti-Corruption FR*, internal company document, 2022). In the social area, organizational culture and human capital development are at the forefront.

The company's operations emphasize the operationalization of ESG goals through the use of measurable indicators (KPIs) and analytical tools. Particular importance is attached to solutions that enable the assessment of the environmental impact of products throughout their

entire life cycle, such as the Green Impact Index. These tools support decision-making processes and enable the incorporation of environmental criteria into product design.

The company's innovation activities encompass both product and process innovations. Key areas of activity include the development of more environmentally friendly product formulas and the elimination of selected chemical substances (e.g., through the use of internal lists of restricted ingredients), increasing the share of recycled materials in packaging, and reducing the use of plastics. Implementing logistics solutions aimed at reducing emissions (e.g., intermodal transport and optimizing logistics operations) as well as the digitalization of operational processes, including reducing the use of paper documentation, are also crucial.

5.2. Thematic analysis

Thematic analysis is the process of systematically transforming qualitative textual data (conversation transcripts) into measurable or structured findings. This method allows for the identification of key themes, emotions, and opinions and is widely used in scientific research. After transcribing the interviews, eliminating irrelevant information, and selecting key fragments (so-called meaning units), thematic analysis was conducted, consistent with the approach of Braun and Clarke (2024). This included the following steps: 1) Familiarization with the material; 2) Data coding; 3) Grouping codes into themes; 4) Identifying relationships between themes; 5) Interpretation and inference; 6) Creating a research narrative.

The analysis resulted in the identification of eight "Themes" and their associated "Codes". The respondents' statements were subjected to "Interpretation and inference" (see Table 2).

Table 2.

Topics identified through thematic analysis, along with interpretation of statements and conclusions

No.	Topic	Main Codes	Interpretation and Inference
1.	ESG as a strategic business imperative	• The strategic role of ESG, • Competitive advantage, • Long-term value, • Integrating ESG into corporate strategy, • Responsible development.	One of the most common themes is the perception of ESG not as a formal requirement, but as a strategic element of building competitive advantage. Respondents indicate that ESG activities are increasingly integrated into decision-making processes and organizational development. R1 emphasizes that "...regulatory pressure in Poland is relatively limited, while companies impose high standards of responsibility on themselves". R2 shares a similar view, pointing out that "ESG has become an integral element of the company's CSR strategy and long-term development". According to R3, ESG activities serve as a "strategic filter" through which market signals are interpreted and investment decisions are made.
2.	Measurement and monitoring of the effects of activities in areas E, S and G	• ESG measurement, • environmental indicators, • carbon footprint, • Green Impact Index, • SBTi.	To measure environmental performance, the company utilizes tools such as the Green Impact Index, Science Based Targets Initiative (SBTi), carbon footprint analysis, ESG audits, scorecard systems, and Ecocert and Ecolabel certifications. Of particular importance is the Green Impact Index, which evaluates products in terms of CO ₂ emissions, resource consumption, impact on biodiversity, and overall environmental impact.

Cont. table 2.

3.	Growing stakeholder pressure as a catalyst for ESG transformation	• customer pressure, • consumer expectations, • retail chain requirements, • ESG audits, • ESG scoring, • transparency.	ESG is becoming a mechanism for coordinating relationships across the entire value chain. Stakeholder requirements provide a significant impetus for implementing green innovations and organizational changes. The strongest pressure comes from customers and retail chains. Respondents point to companies such as Carrefour, Castorama, Rossmann, and Leroy Merlin as organizations requiring increasingly advanced environmental data and compliance with specific ESG standards. Growing consumer awareness is also a recurring theme. Consumers expect natural products, biodegradable formulas, recycled packaging, and transparency of ingredients. Respondents note that customer requirements are increasingly taking the form of formal ESG rating systems. These systems influence purchasing decisions and business relationships.
4.	Regulations as a source of innovation	• regulatory compliance, • product reformulation, • eco-design, • regulations as a driver of development, • technological adaptation.	Regulations are perceived not only as constraints but also as a source of innovation. The most frequently cited legal acts include REACH, CLP, biocidal products regulations, packaging and recycling regulations, the Green Claims Directive, the AGECA Act, and regulations on emissions and carbon footprints. Respondents emphasize that the need to adapt formulations, packaging, and production processes leads to the search for new technological solutions. Respondents R7 and R8, in particular, point out that the shortening deadlines for implementing new regulations require faster adaptation processes and the development of organizational competencies.
5.	Green innovation as a combination of efficiency and environmental responsibility	• green innovation, • eco-innovation, • product innovation, • process innovation, • environmental responsibility.	The Altaïr Groupe has developed a "green innovation" model in which environmental criteria are an integral element of the innovation process, not an additional requirement. Respondents define innovation much more broadly than just introducing new products. Innovations include: new product formulas, packaging solutions, production process improvements, organizational changes, digital tools, and new business models. Innovation is characterized by a strong link between environmental aspects. According to R3, "...innovation means creating solutions that are technically effective and environmentally responsible". Respondents emphasize the need to maintain a balance between product effectiveness, safety, the natural origin of ingredients, and environmental impact.
6.	Systematic management of ESG innovations	• Project management, • Innovation committee, • Stage-Gate process, • Environmental assessment, • ESG validation.	The analysis indicates a high degree of formalization in the new product development process. It encompasses stages such as market needs identification, feasibility analysis, research and development, environmental assessment, technical validation, economic evaluation, and industrial implementation. The innovation committee and the Stage-Gate process play a significant role. A particularly important element is the mandatory assessment of the environmental impact of products prior to their launch.

Cont. table 2.

7.	Factors contributing to the creation of green innovations	• Strategic orientation, • Interdepartmental collaboration, • Interdisciplinarity, • Research, development, and technological competencies, • Organizational culture, • Organizational flexibility, • Crises.	The most important factor driving innovation is the integration of ESG into a company's strategy. Collaboration between departments such as Marketing, R&D, Regulatory Affairs, Procurement, Sales, Finance, Production, and Logistics is crucial. Interdisciplinarity allows for simultaneous consideration of market, environmental, technological, and economic requirements. Employee engagement, openness to new solutions, and a willingness to take risks are crucial. R2 and R3 emphasized the importance of communication and an organizational culture that fosters experimentation and learning. Respondents point to the Group's significant research and development potential, including its own laboratories, formula development, and the ability to co-create products with suppliers. The Group's technological competences enable rapid adaptation to new trends and regulations. Respondents emphasize that the Group's medium size provides it with organizational flexibility and allows for more effective implementation of new solutions than large corporations. An interesting finding from the research is the perception of crisis situations (COVID-19, the war in Ukraine, inflation) as factors that motivate the search for new solutions and increase the organization's ability to adapt.
8.	Barriers to the development of green innovations	• resistance to change, • costs of innovation, • regulatory barriers, • technological barriers.	Respondents identified a number of factors limiting the development of green innovations. The most frequently cited barriers include: organizational barriers (resistance to change, limited human resources, process complexity), economic barriers (high product reformulation costs, pressure on short-term financial results, customer price sensitivity), regulatory barriers (growing number of regulations, short implementation timelines, lengthy certification procedures), and technological barriers (difficulty reconciling product effectiveness with the natural origin of ingredients, limited availability of certain raw materials).

Source: own study based on conducted research.

6. Synthetic Conclusions and Recommendations

The collected empirical material provided answers to four research questions. The Altaïr Groupe case study can serve as an example of a company's transformation toward a sustainable operating model. Both the analysis of organizational documentation and the thematic analysis indicate that ESG serves as a strategic mechanism for managing the company's development at the Altaïr Groupe. Furthermore, it is strongly linked to innovation processes, guiding the development of products, processes, and stakeholder relationships. ESG is becoming a mechanism for coordinating relationships throughout the value chain. Stakeholder requirements provide a significant impetus for implementing green innovations and organizational changes. The strongest pressure comes from regulators, retail chains, and consumers. The new product development process is highly formalized within the Group.

It includes stages such as market needs identification, feasibility analysis, research and development, environmental assessment, technical validation, economic assessment, and industrial implementation. The Innovation Committee and the Stage-Gate process play a significant role. Key factors contributing to the development of innovation include: strong strategic leadership, cross-departmental collaboration, well-developed R&D competencies, organizational culture, and organizational flexibility. Barriers include: resistance to change, high innovation costs, and regulatory and technological barriers.

The Altaïr Groupe is an example of a sustainable business model in which ESG serves as a strategic catalyst for innovation. Further improvement in the Group's ability to create green innovations in the context of its sustainable development strategy could include:

First: Strengthening the Open Innovation System - Respondents indicate that most innovations are developed internally or with suppliers. Expanding the collaboration network could increase the diversity of knowledge sources. It is worthwhile to expand collaboration to include universities, R&D units, cleantech startups, and organizations focused on the circular economy. This will increase access to breakthrough technologies and shorten the time to commercialization of new solutions.

Second: Expanding the ESG foresight system - The regulatory framework in the industry is constantly growing in complexity. Respondents believe that the short timeframe for implementing new regulations poses a significant challenge. Therefore, it is recommended to create a formal ESG foresight system, encompassing: analysis of future legislative changes, market development scenarios, analysis of low-emission technologies, and identification of future consumer expectations.

Third: Development of ESG competencies across the organization - One of the most frequently cited barriers to innovation was the resistance to change among some employees. Therefore, despite the high level of ESG awareness among management, it is worthwhile to systematically develop the competencies of employees at all levels. This can be achieved through ESG training, ESG ambassador programs, workshops on green innovations, or an employee idea submission system.

7. Conclusion

The conducted research enabled the achievement of the established research objectives. The role of ESG in the ALTAIR Group's management system was defined, the impact of the environment on the Group's ESG activities was demonstrated, and the innovation management method was identified, as well as the factors contributing to and barriers to the ALTAIR Group's innovation activity. Due to the qualitative nature of the research conducted through a single

case study, there is no basis for generalizing the conclusions to the entire industry. Therefore, further research is worthwhile, allowing both to deepen theoretical knowledge and to verify the obtained empirical results. In particular, an interesting avenue of scientific exploration seems to be the assessment of the impact of each ESG dimension (environmental, social, governance) on green innovation, conducted in a quantitative study covering a large group of companies in the household chemicals industry.

References

1. Alok, S., Kumar, N., Wermers, R. (2020). Do fund managers misestimate climatic disaster risk? *The Review of Financial Studies*, Vol. 33, pp. 1146-1183.
2. Altaïr Group (2022). *Code de Conduite anticorruption FR* (internal company document).
3. Altaïr Group (2022). *Code de conduite des relations commerciales* (internal company document).
4. Altaïr Group (2024). *Manifest Groupe Altaïr. Odpowiedzialność społeczna przedsiębiorstwa. Nasze zobowiązania na rzecz zrównoważonego rozwoju* (internal company document).
5. Altaïr Group. *ALTAIR Rapport RSE 2026* (internal company document).
6. Altaïr Group. *Substances Policy 2024* (internal company document).
7. Altaïr Groupe (2024). *Raport CSR*
8. Anastas, P., Warner, J. (1998). *Green Chemistry: Theory and Practice*. New York: Oxford University Press.
9. Bagh, T., Hunjra, A.I., Kossai, M. (2024). Greening the Corporate Landscape: Governance Practices, Green Innovation, and Sustainable Development. *The Journal of Alternative Investments*, Vol. 27, Iss. 1, doi:10.3905/jai.2024.1.212
10. Bothongo, K., Kinyar, A. (2025). Factors associated with the adoption of eco-innovation and its effect on environmental performance in the US household cleaning sector. *Technological Forecasting and Social Change*, Vol. 210(C). Elsevier, <https://doi.org/10.1016/j.techfore.2024.123898>
11. Braun, V., Clarke, V. (2024). *Analiza tematyczna. Praktyczny przewodnik*. Warszawa: PWN.
12. Broadstock, D., Matousek, R., Meyer, M., Tzeremes, N. (2020). Does corporate social responsibility impact firms' innovation capacity? The indirect link between environmental & social governance implementation and innovation performance. *Journal of Business Research*, Vol. 119, pp. 99-110. <https://doi.org/10.1016/j.jbusres.2019.07.014>
13. Brunel SAS (2025). *CLIM'ACT - réunion du 04/11/25* (internal company document).

14. Cabaleiro-Cerviño, G., Mendi, P. (2024). ESG-driven innovation strategy and firm performance. *Eurasian Business Review*, Vol. 14, pp. 137-185, <https://doi.org/10.1007/s40821-024-00254-x>
15. Chen, L., Khurram, M., Gao, Y., Abedin, M., Lucey, B. (2023). ESG disclosure and technological innovation capability of the Chinese listed Companies. *Research in International Business and Finance*, Vol. 65(C). Elsevier, <https://doi.org/10.1016/j.ribaf.2023.101974>
16. Cheng, M., Lin, B., Lu, R., Wei, M. (2020). Non-controlling large shareholders in emerging markets: evidence from China. *Journal of Corporate Finance*, Vol. 63, doi: 10.1016/j.jcorpfin.2017.09.010101259
17. Choi, D., Gao, Z., Jiang, W. (2020). Attention to global Warming. *The Review of Financial Studies*, Vol. 33, pp. 1112-1145, <https://doi.org/10.1093/rfs/hhz086>
18. De Medeiros, J., Garlet, T., Ribeiro, J., Cortimiglia, M. (2022). Success factors for environmentally sustainable product innovation: An updated review. *Journal of Cleaner Production*, Vol. 345, Iss. 2. Retrieved from: <https://doi.org/10.1016/j.jclepro.2022.131039>, 13.03.2026.
19. De Silva Lokuwaduge, C.S., De Silva, K.M. (2022). ESG Risk Disclosure and the Risk of Green Washing. *Australasian Accounting, Business and Finance Journal*, Vol. 16, Iss. 1. pp. 146-159. ISSN 1834-2000
20. Desalegn, G., Tangl, A. (2022) Forecasting green financial innovation and its implications for financial performance in ethiopian financial institutions: Evidence from ARIMA and ARDL model. *National Accounting Review*, Vol. 4, Iss 2, pp. 95-111. doi: 10.3934/NAR.2022006
21. Dicuonzo, G., Donofrio, F., Ranaldo, S., Dell'Atti, V. (2022). The effect of innovation on environmental, social and governance (ESG) practices. *Meditari Accountancy Research*, Vol. 30, Iss. 4, pp. 1191-1209. Retrieved from: <https://doi.org/10.1108/MEDAR-12-2020-1120>, 12.04.2026
22. Elnahas, A., Kim, D., Kim, I. (2018). *Natural disaster risk and corporate leverage*. Retrieved from: <https://ssrn.com/abstract=3123468>, 02.06.2026
23. Fei, J., Wang, Y., Yang, Y., ..., Zhi, Q. (2016). Towards Eco-city: The Role of Green Innovation. *Energy Procedia*, Vol. 104, pp. 165-170. Retrieved from: <https://doi.org/10.1016/j.egypro.2016.12.029>. 14.03.2026
24. Fuente, G., Ortiz, M., Velasco, P. (2022). The value of a firm's engagement in ESG practices: Are we looking at the right side? *Long Range Planning*, Vol. 55, Iss. 4, <https://doi.org/10.1016/j.lrp.2021.102143>
25. Glegg, G.A., Richards, J.P. (2007). Chemicals in household products: Problems with solutions. *Environmental Management* Vol. 40, pp. 889-901. <https://doi.org/10.1007/s00267-007-9022-1>
26. <https://www.chemiaibiznes.com.pl>, 05.05.2026.

27. Idahosa-Taylor, E., Collins, S. (2019). Chemical Regulation at the European Level: Safeguarding Consumer Health and Protecting the Environment. In: R. Duarte-Davidson, T. Gaulton, S. Wyke, S. Collins (Eds.), *Chemical Health Threats: Assessing and Alerting, The Royal Society of Chemistry* (pp. 24-35). DOI: 10.1039/9781782623687-00024
28. Jaheer Mukthar, K.P., Madraswale, M.A., Nagadeepa, C., Orel, V., Korniietskyi, O., Kotvytska, N. (2026). Sustainable Eating: Green Labeling on Grocery Purchasing Decisions. In: El Khoury, R. (Ed.), *Business Models of the Future. Studies in Systems, Decision and Control, vol. 238*. Cham: Springer. Retrieved from: https://doi.org/10.1007/978-3-031-85398-2_14
29. Khalil, M., Iqbal, M., Turan, V., ..., Yasin, S. (2022). Household chemicals and their impact. In: *Advances in Pollution Research, Environmental Micropollutants* (pp. 201-232). Elsevier. Retrieved from: <https://doi.org/10.1016/B978-0-323-90555-8.00022-2>
30. Khan, P.A., Johl, S.K., Kumar, A., Luthra, S. (2023) Hope-hype of green innovation, corporate governance index, and impact on firm financial performance: a comparative study of Southeast Asian countries, *Environmental science and pollution research international*, 30(19), 55237-55254. Retrieved from: <https://doi.org/10.1007/s11356-023-26262-4>
31. Kumar, A., Rawat, M., Bhatnagar, P., Hussain, Z. (2025). Emerging Green Technologies and Renewable Energy Sources for Sustainable Eco-Innovation: Understanding the Concept of a Green Society. In: Chakir, A., Bansal, R., Andry, J.F., Rabby, F., Hussain, M. (Eds.), *Green Society, Environmental Strategies and Sustainable Development*. Cham: Springer. Retrieved from: https://doi.org/10.1007/978-3-031-94086-6_1, 10.05.2026.
32. Larashati, I., Machmud, S., Sidharta, I., Dwiyanisa, A. (2026). Understanding generation Z's intentions to adopt green products: The influence of perceived effectiveness, environmental awareness, and social norms. *Multidisciplinary Reviews, Vol. 9 , Iss. 6*, doi: 10.31893/multirev.2026269
33. Latif, R.M.A., Shafiq-Ur-Rehman, M., Ullah, F., ..., Tariq, M.S. (2025). *Strategic Green Innovation for Sustainable Business Models in Emerging Economies: Framework and Case-Based Insights*. 8th International Conference on Energy Conservation and Efficiency (ICECE), Lahore, Pakistan, 2025, pp. 1-6, doi: 10.1109/ICECE69114.2025.11272932
34. Li, L., Yi, Z., Jiang, F., ..., Zhou, J. (2023). Exploring the mechanism of digital transformation empowering green innovation in construction enterprises. *Developments in the Built Environment, Vol. 15, Iss. 2*, doi: 10.1016/j.dibe.2023.100199
35. Liu, B., Ren, X., Liu, D., Liu, J., Zhang, Q., Huang, H., Xu, R., Wang, R., Liu, C., He, Z. et al. (2022). Ground Validation Experiment and Spectral Detection Capability Evaluation of Mars Mineralogical Spectrometer (MMS) Aboard HX-1 Orbiter. *Space Science Review, Vol. 218*, doi: 10.1007/s11214-021-00858-z
36. Luchsinger, L., Bearth, A. (2026). Hazardous household chemicals and consumer segments: risk awareness, optimistic bias and risk reduction strategies. *Safety Science, Vol. 201*. <https://doi.org/10.1016/j.ssci.2026.107259>

37. Marco-Lajara, B., Zaragoza-Saez, P., Martínez-Falcó, J. (2023). Green innovation: Balancing economic efficiency with environmental protection. In: C.R. Popescu (Ed.), *Frameworks for Sustainable Development Goals to Manage Economic, Social, and Environmental Shocks and Disasters*, doi:10.4018/978-1-6684-6750-3.ch013
38. Martínez-Falcó, J., Sánchez-García, E., Marco-Lajara, B., Millán-Tudela, L.A. (2024). Green innovation: Integrating economic growth with environmental stewardship. In: Martínez-Falcó, J., Marco-Lajara, B., Sánchez-García, E., Millán-Tudela LA (Eds.), *Green Supply Chain Management Practice and Principles*, doi: 10.4018/979-8-3693-3486-7.ch008
39. Miao, Q., Popp, D. (2014). Necessity as the mother of invention: innovative responses to natural disasters. *Journal of Environmental Economics and Management*, Vol. 68, pp. 280-295. Retrieved from: <https://doi.org/10.1016/j.jeem.2014.06.003>, 10.04.2026.
40. PKO Bank Polski S.A. (2020). *Branża chemii gospodarczej. Wzrost znaczenia polskich producentów na świecie, opracowanie Biura Strategii i Analiz Międzynarodowych PKO BP*. Retrieved from: <https://www.wspieramyeksport.pl/raporty-branzowe>, 18.05.2026.
41. Quan, S., Cheng, P., Zhai, J. (2025). Do climate risks impede green innovation? *International Review of Financial Analysis*, Vol. 104, Part A. Retrieved from: <https://doi.org/10.1016/j.irfa.2025.104295>, 10.05.2026.
42. Rayfield, B., Unsal, O. (2021). Institutional monitoring and litigation risk: evidence from employee disputes. *Journal of Financial Research*, Vol. 44, Iss. 1, pp. 81-119. Retrieved from: <https://doi.org/10.1111/jfir.12235>, 12.04.2026.
43. Remonnay, I. (2025) Toward a Holistic Approach to the Chemical Industry Cycle. In: Dal Pont, J.P. (ed.), *Technical and Economical Evaluation of Products at the Early Development Stage: Safe and Sustainable Product Design*. DOI: 10.1002/9781394417773.ch2
44. Sanclaudio, M., Garcés-Galdeano, L., Morales, I. (2025). Enhancing innovation through ESG practices: the superior impact on family businesses. *Journal of Family Business Management*, Vol. 15, No. 5, pp. 1219-1242, doi: <https://doi.org/10.1108/JFBM-09-2024-0234>
45. Sun, J.K., Zhang, D. (2025). Powering innovation through sustainability: exploring the effects of firm ESG performance on innovation volume and value. *Social Responsibility Journal*, Vol. 21, No. 7, pp. 1503-1528. Retrieved from: <https://doi.org/10.1108/srj-10-2024-0737>, 12.03.2026.
46. Tang, H. (2022). The Effect of ESG Performance on Corporate Innovation in China: The Mediating Role of Financial Constraints and Agency Cost. *Sustainability*, 14(7), 3769. Retrieved from: <https://doi.org/10.3390/su14073769>, 12.03.2026.
47. Thomas, A., Palladino, R., Nespoli, C., ..., Russo, G. (2022). Determinants and outcomes of green innovations: A conceptual model. In: Ordóñez de Pablos, P. (Ed.), *Handbook of*

Research on Building Greener Economics and Adopting Digital Tools in the Era of Climate Change, DOI: 10.4018/978-1-6684-4610-2.ch003

48. Ujaczki, É., Backmann, J. (2026). Change of tides in European chemical legislation a turning point in European chemicals policy: reconciling green ambitions with the viability of the manufacturing sector in Europe. *RSC Sustainability*, Vol. 4, pp. 720-725. Retrieved from: <https://doi.org/10.1039/d5su00746a>, 12.05.2026.
49. Yoo, J., Song, W., Ku, J. (2024). CEO turnover, ESG- washing, and firm value. *Managerial and Decision Economics*, Vol. 45, Iss. 5, pp. 2801-2819, doi.org/10.1002/mde.4123.
50. Zhang, Z., Hou, Y., Li, Z., Li, M. (2024). From symbolic to substantive green innovation: How does ESG ratings optimize corporate green innovation structure. *Finance Research Letters*, Vol. 63. Retrieved from: <https://doi.org/10.1016/j.frl.2024.105401>, 12.04.2026.
51. Zhou, S., Rashid, M., Zobair, S., Sobhani, F., Siddik, A. (2023). Does ESG Impact Firms' Sustainability Performance? The Mediating Effect of Innovation Performance. *Sustainability*, Vol. 15, Iss. 6, p. 5586. Retrieved from: <https://doi.org/10.3390/su15065586>, 16.03.2026.