

Green Competitiveness of the National Economy: Evolution in the Context of Sustainability and Resilience

Liu Kenan¹, Olena Chygryn²

Abstract. The challenges posed by climate change and limited natural resources have significantly transformed traditional approaches to assessing the competitiveness of the national economy. In this context, the concept of green competitiveness has emerged as an important analytical framework that integrates economic performance with environmental sustainability and efficient resource use. At the same time, global environmental and socio-economic shocks have highlighted the importance of resilience as a key factor ensuring the stability and adaptability of national economies. This study aims to analyse the evolution of green competitiveness of the national economy in the context of sustainability and resilience, and to identify the main research trends in this field. The study is based on a combination of literature review and bibliometric analysis of scientific publications indexed in the Scopus database. The methodological approach includes keyword co-occurrence analysis and the visualisation of bibliometric networks using VOSviewer. This approach enables the identification of dominant research directions, thematic clusters, and relationships among key concepts in the scientific literature. The results demonstrate that the concept of competitiveness has gradually evolved from a purely economic interpretation toward a more comprehensive framework that incorporates environmental sustainability and social stability. The analysis of bibliometric maps reveals that studies on competitiveness are closely interconnected with sustainable development, environmental innovation, green economy, and climate policy. At the same time, recent research increasingly integrates the concept of social resilience, emphasising the capacity of economic systems to adapt to environmental and socio-economic shocks. The findings confirm that green competitiveness is becoming an important component of sustainable economic development and long-term national competitiveness.

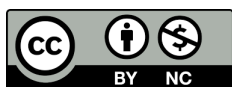
Keywords: green competitiveness, national economy, sustainable development, green economy, social resilience, environmental innovation, competitiveness, sustainability.

Funding: This research was funded by a grant from the Ministry of Education and Science of Ukraine (Grant No. 0126U000592).

Received: 11 February 2026 | **Revised:** 20 March 2026 | **Accepted:** 23 March 2026 | **Published:** 30 March 2026

Suggested Citation

Kenan, L., & Chygryn, O. (2026). Green Competitiveness of the National Economy: Evolution in the Context of Sustainability and Resilience. *Oblik i finansy*, 1(111), 177-184. [https://doi.org/10.33146/2518-1181-2026-1\(111\)-177-184](https://doi.org/10.33146/2518-1181-2026-1(111)-177-184)



This is an open access article under the terms of the Creative Commons Attribution-NonCommercial 4.0 License (<http://www.creativecommons.org/licenses/by-nc/4.0/>), which permits use and distribution in any medium, provided the original work is properly cited and the use is non-commercial.

© The Author(s) 2026

¹ Liu Kenan, Sumy State University, Ukraine.

ORCID 0009-0006-3585-5246

² Olena Chygryn, Sumy State University, Ukraine.

ORCID 0000-0002-4007-3728

E-mail: o.chygryn@biem.sumdu.edu.ua (Corresponding author)

Зелена конкурентоспроможність національної економіки: еволюція в контексті сталого розвитку та стійкості

Лі Кенан¹, Олена Чигрин¹

¹ Сумський державний університет, Україна

Анотація. Виклики, пов'язані із зміною клімату та обмеженістю природних ресурсів суттєво трансформували традиційні підходи до розуміння конкурентоспроможності національної економіки. У цьому контексті концепція зеленої конкурентоспроможності сформувалася як важлива аналітична основа, що поєднує економічну результативність із екологічною стійкістю та ефективним використанням ресурсів. Водночас глобальні екологічні та соціально-економічні потрясіння підкреслили значення резилієнтності як ключового чинника забезпечення стабільності та адаптивності національних економік. Метою дослідження є аналіз еволюції зеленої конкурентоспроможності національної економіки в контексті сталого розвитку та резилієнтності, а також визначення основних дослідницьких тенденцій у цій сфері. Дослідження ґрунтується на поєднанні огляду наукової літератури та бібліометричного аналізу наукових публікацій, індексованих у базі даних Scopus. Методологічний підхід передбачає аналіз співзвучності ключових слів та візуалізацію бібліометричних мереж із використанням програмного забезпечення VOSviewer. Такий підхід дозволяє визначити домінуючі напрями досліджень, тематичні кластери та взаємозв'язки між ключовими поняттями в науковій літературі. Результати дослідження свідчать, що концепція конкурентоспроможності поступово еволюціонувала від суто економічного трактування до більш комплексної концептуальної моделі, яка інтегрує екологічну стійкість і соціальну стабільність. Аналіз бібліометричних карт показує, що дослідження конкурентоспроможності тісно пов'язані з проблематикою сталого розвитку, екологічних інновацій, зеленої економіки та кліматичної політики. Водночас сучасні дослідження дедалі частіше інтегрують концепцію соціальної резилієнтності, підкреслюючи здатність економічних систем адаптуватися до екологічних та соціально-економічних потрясінь. Отримані результати підтверджують, що зелена конкурентоспроможність стає важливою складовою сталого економічного розвитку та довгострокової конкурентоспроможності національних економік.

Ключові слова: зелена конкурентоспроможність, національна економіка, сталий розвиток, зелена економіка, соціальна стійкість, екологічні інновації, конкурентоспроможність.

Фінансування: це дослідження було профінансовано грантом Міністерства освіти і науки України (№ 0126U000592).

INTRODUCTION

In recent decades, global environmental challenges have significantly reshaped the priorities of economic development and national competitiveness. Climate change, environmental degradation, and the depletion of natural resources are increasingly affecting economic systems, production structures, and international competitiveness. According to the Intergovernmental Panel on Climate Change, global greenhouse gas emissions reached approximately 59 GtCO₂-equivalent in 2019, the highest level in human history, highlighting the growing environmental pressure associated with economic activity (IPCC, 2022). These challenges require countries to reconsider traditional models of economic growth and integrate sustainability principles into national development strategies.

At the same time, the transition toward a green economy has become a key priority for governments and international organisations. Global investment in clean energy technologies reached more than USD 1,7 trillion in 2023, exceeding investment in fossil fuels and demonstrating the accelerating shift toward low-carbon development (IEA, 2023). This transformation is fundamentally changing the sources of economic competitiveness, as technological innovation, resource

efficiency, and environmental performance are becoming critical factors shaping long-term economic advantages.

In this context, the concept of green competitiveness has emerged as an important framework linking economic performance with environmental sustainability. Green competitiveness reflects the ability of national economies to achieve economic growth while reducing environmental pressures, improving resource efficiency, and promoting environmentally friendly technological innovation. Countries that successfully integrate green technologies and sustainable production practices into their economic systems are increasingly gaining competitive advantages in global markets.

Recent global crises, including climate-related disasters, pandemics, and geopolitical instability, have further emphasized the importance of resilience as a key characteristic of modern economic systems. Resilience refers to the capacity of economies and societies to adapt to external shocks, recover from disruptions, and maintain sustainable development trajectories. According to the World Bank, climate change could push up to 132 million people into poverty by 2030 if effective mitigation and adaptation measures are not implemented (World Bank, 2020). These risks highlight the growing

importance of integrating sustainability and resilience into economic development strategies.

As a result, modern research increasingly examines competitiveness through the combined perspectives of sustainability, green transformation, and resilience. Understanding how these concepts interact is essential for explaining the evolving nature of national competitiveness in the context of global environmental and socio-economic challenges.

RESEARCH OBJECTIVE

This study aims to analyse the evolution of green competitiveness of the national economy in the context of sustainability and resilience, and to identify the main research trends in this field.

LITERATURE REVIEW

The concept of competitiveness has increasingly been examined through the lens of sustainable development. Traditional approaches associated national competitiveness mainly with productivity, technological development, and market efficiency. However, growing environmental challenges and climate change have led researchers to reconsider the role of environmental factors in economic development and to integrate sustainability principles into competitiveness frameworks.

A significant contribution to this discussion is related to the concept of sustainable competitiveness, which emphasises the need to balance economic growth with environmental and social sustainability. Researchers highlight that long-term competitiveness increasingly depends on the efficient use of natural resources, environmental innovation, and the implementation of sustainable development strategies (Balkytė & Tvaronavičienė, 2010).

Further development of these ideas is connected with studies on the green economy and environmental innovation. In particular, the Porter hypothesis suggests that properly designed environmental regulations can stimulate innovation and contribute to improving competitiveness (Porter & van der Linde, 1995). Recent studies also emphasize the role of renewable energy, circular economy principles, and green technological development as important drivers of green competitiveness of national economies (OECD, 2011). At the same time, modern research increasingly incorporates the concept of resilience, which reflects the ability of economic systems to adapt to environmental and economic shocks. Scholars emphasise that resilience strengthens national economies' capacity to sustain sustainable growth amid climate change and global uncertainty.

Recent studies increasingly emphasise the role of green innovation and environmental policy as key drivers of national competitiveness. In particular, recent empirical research demonstrates that investments in research and development, renewable energy, and environmental innovation significantly influence the competitive performance of national economies and their export potential in environmentally oriented sectors.

These studies show that innovation capacity and green technological development are among the most important factors shaping green trade competitiveness and economic resilience in the context of sustainability transitions (Teixeira, 2025; Consoli et al., 2023). Another important research direction focuses on measuring green innovation competitiveness and developing composite indicators to assess countries' environmental specialisation and innovation potential. Recent studies propose new indices based on green patent activity and international trade indicators, demonstrating that both green and non-green innovation competitiveness significantly impact export performance and long-term economic development (Algieri, 2025; Qazi et al., 2024). Contemporary research highlights the role of green innovation and technological transformation in strengthening sustainable competitiveness. Empirical evidence indicates that the implementation of environmentally friendly production processes, innovation capacity, and green dynamic capabilities significantly contribute to sustainable economic growth and improve the competitiveness of firms and national economies (Sohu, 2024; Carissimi et al., 2024; Noman et al., 2024).

Despite the growing number of studies devoted to sustainability, green economy, and resilience, the conceptual evolution of green competitiveness of the national economy and its integration with sustainability and resilience remains insufficiently systematised in the scientific literature. Therefore, further research is needed to analyze the development of this concept and identify the key directions of its evolution.

RESEARCH METHODOLOGY

This study is based on a combination of literature review and bibliometric analysis, which allows for identifying the main research directions and the conceptual evolution of green competitiveness in the context of sustainability and resilience. The methodological approach integrates qualitative and quantitative analyses of scientific publications to systematise existing theoretical approaches and reveal relationships among key concepts in the scientific literature.

The bibliometric analysis was conducted using data from the Scopus database, one of the largest international databases of peer-reviewed scientific publications. The search query was formed using keywords related to the research topic, including green competitiveness, sustainable development, green economy, competitiveness, and resilience. To analyse the relationships between research topics, co-occurrence analysis of keywords was applied. This method allows for identifying the most frequently used concepts in scientific publications and examining their connections. The visualisation of bibliometric networks was performed using the VOSviewer software, which enables the construction of graphical maps illustrating the structure of research fields, thematic clusters, and the intensity of relationships between keywords.

Figure 1 presents the keyword co-occurrence network, illustrating the structure of scientific research on competitiveness and sustainable development. The visualisation reveals several interconnected thematic clusters that reflect the main directions of contemporary research in this field. The central cluster centres on the keywords “sustainable development,” “competition,” “sustainability,” and “competitiveness.” These concepts occupy the core of the network, indicating the strong relationship between economic competitiveness and sustainable development in modern research. The innovation and technological development cluster includes keywords such as “digital transformation,” “digital technologies,” “industry 4.0,” and “data

analytics.” This cluster highlights the growing importance of technological innovation and digitalisation in improving competitiveness and supporting sustainable development. Another cluster concerns environmental sustainability and climate policy, represented by terms such as “climate change,” “carbon emissions,” “energy policy,” and “clean energy.” This group of studies focuses on environmental challenges and the transition to low-carbon development. The identified clusters demonstrate that research on competitiveness and sustainable development integrates economic, technological, and environmental perspectives, reflecting the field’s interdisciplinary nature.

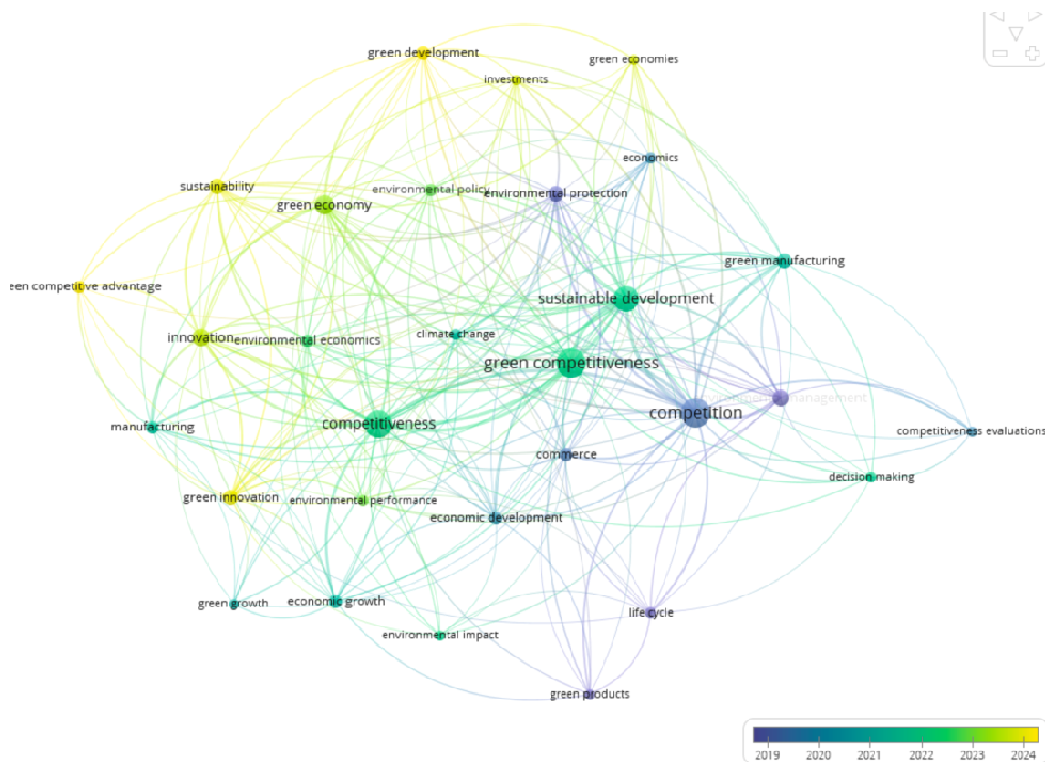


Figure 2. Keyword co-occurrence network of research on green competitiveness and the green economy

Source: compiled by the authors using VOSviewer based on Scopus data.

Figure 2 illustrates the keyword co-occurrence network, reflecting the structure of scientific research on green competitiveness and the green economy. The visualisation highlights several interconnected thematic clusters that represent the main directions of research in this field. The central cluster centres on the keywords “green competitiveness,” “sustainable development,” and “competitiveness.” These concepts occupy the core of the network, indicating that green competitiveness is closely connected with broader discussions on sustainability and economic development. The green economy and environmental policy cluster includes keywords such as “green economy,” “green development,” “environmental protection,” and “environmental economics.” This cluster reflects research focused on environmental regulation, ecological modernisation, and the transition toward environmentally sustainable economic systems. Another cluster is related

to innovation and economic growth, represented by keywords such as “green innovation,” “green growth,” “economic growth,” and “environmental performance.” Studies within this cluster analyse how technological innovation and environmentally friendly production processes contribute to the development of competitive and sustainable economies. The industrial transformation and management cluster includes keywords such as “green manufacturing,” “decision making,” “competition,” and “management.” This cluster highlights research examining how firms and industries adapt their production strategies and management practices to address sustainability challenges. The identified clusters demonstrate that research on green competitiveness is strongly interconnected with the development of the green economy, environmental policy, innovation processes, and industrial transformation.

keywords such as sustainable development, sustainability, and competitiveness indicates that researchers have begun to integrate environmental and social dimensions into traditional competitiveness frameworks. This approach reflects a shift from a purely economic interpretation of competitiveness toward a broader understanding that incorporates long-term environmental and social considerations.

The interaction between green competitiveness and the green economy illustrates the strengthening of the environmental dimension of competitiveness. In this context, keywords such as green economy, green innovation, green development, and environmental protection highlight the growing importance of ecological modernization, resource efficiency, and low-carbon development strategies. Research within this area increasingly emphasizes the role of environmentally friendly technologies and sustainable resource management as key drivers of competitive advantages for national economies.

The connection between green competitiveness and social resilience reflects the current direction of this research field. The presence of keywords such as social resilience, climate change, vulnerability, and adaptive capacity indicates a growing interest in the capacity of economic and social systems to adapt to environmental and socio-economic challenges. In this context, resilience is increasingly seen as a crucial component of sustainable competitiveness, particularly amid climate risks and global uncertainty.

The observed patterns demonstrate a gradual transformation in the scientific discourse: from the integration of sustainability into competitiveness research to the development of the green economy paradigm and the growing focus on resilience and adaptive capacity. This evolution highlights the recognition that the long-term competitiveness of national economies depends not only on economic performance but also on environmental sustainability and the ability to respond effectively to global challenges.

CONCLUSION

The conducted study examined the conceptual evolution of green competitiveness of the national economy within the framework of sustainability and resilience. The results confirm that contemporary approaches to competitiveness increasingly extend beyond traditional economic interpretations and incorporate environmental and social dimensions of development.

The bibliometric analysis of publications indexed in Scopus identified the main research directions and thematic clusters within the scientific discourse.

The visualisation of keyword co-occurrence networks demonstrates that studies on competitiveness are closely interconnected with issues of sustainable development, environmental policy, technological innovation, and energy transition. These results indicate the growing integration of sustainability principles into the theoretical and methodological frameworks of competitiveness research. The findings also highlight the growing relevance of the concept of green competitiveness, which reflects a nation's ability to achieve economic growth while reducing environmental pressures and improving resource efficiency. In this context, particular attention in the scientific literature is devoted to the role of environmental innovation, renewable energy development, and environmentally oriented policies as key factors shaping long-term competitive advantages.

In addition, the analysis reveals a growing research interest in the concept of resilience, which emphasises the capacity of economic and social systems to adapt to environmental and socio-economic shocks. The integration of resilience into the conceptual framework of green competitiveness underscores the need to ensure the stability and adaptability of national economies amid climate change and global uncertainty. Overall, the study's results demonstrate the gradual transformation of scientific discourse: from the integration of sustainability principles into competitiveness research to the development of the green economy paradigm and an increasing focus on resilience and adaptive capacity. These findings confirm that the long-term competitiveness of national economies depends not only on economic performance but also on environmental sustainability and the ability to respond effectively to global environmental and socio-economic challenges.

The results obtained contribute to the systematization of theoretical approaches to the concept of green competitiveness and lay the groundwork for further research aimed at developing methodological tools to assess the relationships among sustainability, resilience, and national economic competitiveness.

CRediT Author Statement

Liu Kenan: Conceptualization, Methodology, Data curation, Visualization, Investigation, Software, Validation, Writing – Original draft preparation;
Olena Chygryn: Supervision, Writing – Review and Editing.

Declaration of Conflicting Interests

The authors declare no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

4 References

- Algieri, B., Aquino, A., & Succurro, M. (2025). Green-go: A green innovation competitiveness index. *Sustainable Futures*, 10, 101062. <https://doi.org/10.1016/j.sftr.2025.101062>
- Balkytė, A., & Tvaronavičienė, M. (2010). Perception of competitiveness in the context of sustainable development: Facets of “sustainable competitiveness”. *Journal of Business Economics and Management*, 11(2), 341–365. <https://doi.org/10.3846/jbem.2010.17>
- Carissimi, M. C., Creazza, A., & Colicchia, C. (2023). Crossing the chasm: investigating the relationship between sustainability and resilience in supply chain management. *Cleaner Logistics and Supply Chain*, 7, 100098. <https://doi.org/10.1016/j.clscn.2023.100098>
- Consoli, D., Costantini, V., & Paglialunga, E. (2023). We're in this together: Sustainable energy and economic competitiveness in the EU. *Research Policy*, 52(1), 104644. <https://doi.org/10.1016/j.respol.2022.104644>
- International Energy Agency. (2023). World energy investment 2023. Retrieved from: <https://www.iea.org/reports/world-energy-investment-2023>
- Noman, A. A., Rehman, F., Khan, I., & Saeed, T. (2024). Trade competitiveness and sustainable energy practices: Evidence from BRICS countries. *Energy Strategy Reviews*, 21, 100331. <https://doi.org/10.1016/j.indic.2023.100331>
- OECD. (2011). Towards green growth. <https://doi.org/10.1787/9789264111318-en>
- Porter, M. E., & van der Linde, C. (1995). Toward a new conception of the environment–competitiveness relationship. *Journal of Economic Perspectives*, 9(4), 97–118. <https://doi.org/10.1257/jep.9.4.97>
- Qazi, A. (2024). Exploring the impact of global competitiveness pillars on sustainability performance. *Energy Policy*, 105, 107404. <https://doi.org/10.1016/j.eiar.2023.107404>
- Sohu, J. M. (2024). Driving sustainable competitiveness: Unveiling the nexus of green innovation and sustainable development. *Frontiers in Environmental Science*, 12, 1348994. <https://doi.org/10.3389/fenvs.2024.1348994>
- Teixeira, N. (2025). Green innovation and national competitiveness: Rethinking economic resilience in the sustainability transition. *Sustainability*, 17(17), 7660. <https://doi.org/10.3390/su17177660>
- World Bank. (2020). Poverty and shared prosperity 2020: Reversals of fortune. Retrieved from: <https://www.worldbank.org/en/publication/poverty-and-shared-prosperity>